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The Journal of GENERAL EDUCATION

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THE JOURNAL OF
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EDITORIAL COMMENT

Robert M. Hutchins

When Thomas Jefferson wrote the Declaration of Independence, he did not believe that he was inventing anything. The truths he spoke of were self-evident. He explained the separation of the colonies from England in terms to which he expected the instantaneous assent of mankind.

I believe that the truths of the Declaration of Independence are self-evident. I believe that they still awaken an instantaneous response in the hearts of all men. I believe that they constitute the best weapon in the struggle in which we are engaged.

If they are to be an effective weapon, we have to live by them. And, if we are to live by them, we have to understand them. Though these truths are self-evident, they are not self-explanatory and self-operating. Here we face a host of basic problems. Is "equality" merely equality of opportunity, and does "equality of opportunity" mean merely that everybody shall have an equal chance to get the best of everybody else? Does "liberty" mean simply doing as you please without interference from the government and without any responsibility to the community? Is the "pursuit of happiness" merely the pursuit of my happiness? If I pursue my private advantage, am I pursuing happiness, and shall I, in pursuing my private advantage, be led as by an invisible hand to promote the common good? Does happiness consist in the possession of refrigerators, washing machines, and automobiles, with a set of the *Encyclopaedia Britannica* thrown in? Does the fact that governments are instituted to secure our rights mean that I have the right to demand anything from the government that I and my pressure group want, while at the same time I and my pressure group insist in the name of liberty on freedom from the government?

We need to bring to the surface the truths inscribed on our hearts and vigorously reinterpret and apply them; for we know that we have no longer the simple agrarian society of 1776. Now we must find out whether competition can be a substitute for justice and whether, if indolence and the love of money are the twin curses of mankind, the way to overcome the first is to appeal to the second. We must discover some means of avoiding the conclusion of Bernanos, that a mechanical civilization produces merchandise and devours men. Is there a way in which modern man will be able to live without becoming daily less and less human? What is the relation of private profit and the needs of the community in an industrial age? How can we now accommodate the legitimate demands of society and the imprescriptible rights of the human person? How can we integrate the currents of contempo-

rary ideas and modern scientific knowledge in a more ordered vision of the world and arrive at a synthesis that, while preserving variety and difference, lays the foundation for understanding, communication, and community within our own country and throughout the world? These are hard questions, and the frivolity of American education is revealed by the fact that in its desire to gratify popular whims it has not prepared our people even to discuss these questions or to take them seriously.

The difficulty with acquiring experience is that under modern conditions one false move can lead to calamity. The difficulty with education is that it takes time. If we can avoid blundering into war or talking ourselves into it or scaring the Russians into it, we may have the time. We may then be able to generate enough independent thought within the country so that we can provide the world with a demonstration of a nation living the truths that are inscribed on the hearts of all men. This will require the protection of our institutions of higher learning from those who wish to convert them from centers of independent thought into nursery schools. It will require the most drastic reconsideration and reformation of our educational program. The way is long and hard; but the alternative is catastrophe.

A FREE SOCIETY AND LIBERAL LEARNING

Louis M. Hacker

It is next to impossible to describe "freedom" in a pure sense, for the individual lives in a society; more than that, because he is a social animal, he lives—as his world becomes more complex—in a growing number of voluntarily chosen associations. In each case he surrenders a part of his freedom to act in his own, or selfish, interest and accepts the authority of a group. In some instances he can break away and insist upon his right to dissent. But often the exercise of such a right carries sanctions he risks at his peril.

For example, until recently in the United States, a worker had the freedom to join or not, as he pleased, a trade-union. Today not only must he join, but he is compelled to accept the mandates of the majority or—even more dubious—those of the leadership, not only on industrial questions but frequently on political ones. In many unions, if the leadership takes a strong political line, dissent is likely to lead to dismissal from the union and, in consequence—because a great many contracts are calling for what is tantamount to the closed shop—to loss of a job, pension and insurance rights, and the like. This is an extreme case, certainly, but it does point up an interesting fact: that the areas of free choices can be sharply abridged even when association presumably is voluntary.

Nevertheless, it is true that a distinguishing hallmark of a free society is the number of such freely elected and voluntary associations. We belong to political parties, churches, chambers of commerce, unions or trade-associations, parent-school groups, community chests, learned societies, alumni clubs, voters leagues, and the like. If these should espouse political demands, i.e., agitate for programs of a special interest requiring the participation of the state, then we would call them "pressure groups." The term is frequently used invidiously: pressure groups, presumably, are sinister organizations using unsocial devices to achieve unsocial ends.

Yet this is less than the whole truth. Some pressure groups seek to mask their intentions, and some do employ threats of reprisals in order to obtain compliance from lawmakers. By and large, however, so-called "pressure groups" act in the open and, in fact, because frequently they are taking opposing positions, make it possible for a democratic society to carry on a constantly public debate about significant questions. Pressure group A wants state support for educational institutions on religious foundations. Pressure group A_1 favors only public education and is therefore opposed. Pressure group B wants state support for public housing programs. Pressure group B_1 demands tax reduction—and, therefore, is opposed. Pressure group C seeks special privileges for labor. Pressure group C_1 seeks special privileges for industry. Each opposes the other. These do not always cancel one another out: for then the lot of the lawmaker would indeed be an easy one.

But the presence of so many does give the lawmaker a much greater measure of independence than we are prepared to

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suppose. He can weigh the contending claims of opposing groups and their relative strengths: and the compromises that are effected—all public decisions ultimately are that in a democratic society—reflect the strength of public opinion and of mobilized association.

If agriculture is being heard or if labor is making its presence felt, it is because each is organized, disciplined, and using its suffrage effectively. Interestingly enough, the citizen is most successful when he espouses multiple loyalties, and democracy is safest when many interests are crying to be heard. Freedom of association, in consequence, is one of the most important characteristics of a free society.

Freedom from state oppression is another. As some voluntary associations grow immense—labor, agriculture, industry, war veterans—the state grows in power, too. Today many terms expressing this idea have become common currency; we speak, approvingly or the reverse, of the "welfare state," "statism," "state capitalism," and the like. We want to limit or expand the functions of public authority. We, according to our emotional or intellectual or, indeed, selfish commitments, want security from the cradle to the grave, or public support of education, or the encouragement of small business, or complete freedom of private enterprise, or the suppression of monopoly. In some cases we clamor for complete intervention; in some, for an entirely hands-off policy. In most, however, the positions taken involve obvious inconsistencies. Free enterprise, certainly; but government should protect patents, infant industries, a national merchant marine, and prevent unfair foreign competition. The suppression of monopoly, of course; but government should guarantee farm prices and limit production, permit wage bargaining on a national scale, and allow unions to indicate the numbers of men on the job and the amount of a fair day's work. Here are many confusions and some legitimate demands. Whatever the merits of the particular case being argued, there is no doubt that the state does grow larger and that there are dangers to freedom.

Does this mean—as we take each case on its merits and, in consequence, as we, moving from freedom to necessity, turn over more authority to the state—that a theoretical position cannot be taken and defended? I think it can; at any rate, one of the great requirements of the time is that the effort be made. There are legitimate functions of the state in a free society, and, in defining them, we also set limits on intervention. I wish to discuss two here.

First, we expect of the state the "maintenance of order and stability." We all know what that is, or think we do, although there are many reservations, even to this simple concept. Nevertheless, one can be specific, somewhat along the following lines:

1. The protection of private property is an important element of this function. Romanticists, notably the Marxists, talk of the abolition of wages as an ultimate goal, as though, given free consumer choices, resources will not always be scarce. Private property and unequal wage scales encourage incentive, and, without incentive, economic progress is impossible.

2. But stability cannot be maintained if privilege flourishes; hence an important task of the state is the redistribution of wealth and income. This, in fact, is the most important social role of taxation. Redistribution—if it does not dry up incentive altogether—keeps opportunity alive and makes possible the constant emergence of new adventurers or innovators. The parvenu of the day before yesterday becomes today's business leader and his wife its social leader. The Medici and the Vanderbilts, in their several times, began as upstarts; the influence of their descendants on taste we all know.

3. Again, under this general requirement of order and stability, one may put

the protection of society's credit structure. The state cannot be irresponsible in the management of its finances; for, if these are recklessly handled, private enterprise cannot long survive. A sound monetary and credit system and a manageable public debt are the first concerns of responsible lawmakers; otherwise, economic chaos quickly follows, as the histories of our Continental Congress, the first French Republic, and the German state during the early 1920's clearly indicate. It was the genius of Alexander Hamilton to understand this; and the young American republic got off to a proper start only because the credit worthiness of the country was assured at home and abroad.

4. Does this mean no unbalanced budgets, ever? An idle question, today, as a result of what the experiences of the 1930's and the Keynesian analysis have taught us. Does this mean, too, no state fiscal intervention? Another idle question. In a young or growing economy, there are many areas where private capital cannot enter because it is not powerful enough. Adam Smith and Alexander Hamilton—those two great defenders of the program of private enterprise—saw this. Certainly, in the underdeveloped areas of the world—in the new countries of India and Israel, for example—public investment will have to take place. In our own country the building of the great western trunk railways during 1850–70 and the construction programs of the TVA in the 1930's were required because of the incapacity of private funds to undertake these great tasks.

5. Finally, to maintain order and stability, public authority must take care of society's unemployables. There will always be invalidity, old age, and dependent mothers and children. The term "unemployable" is a limiting one and, as I see it, marks out the outside boundaries of public concern.

This is one broad group of functions for state participation. The second one may be defined and limited under the general rubric of "maintenance of opportunity." A free society cannot survive unless opportunity exists: people must climb up—as many others go down—the ladder of economic success and social recognition.

1. The innovator—the parvenu, if you will—must be protected against inherited or special privilege.

2. Scientific and technological research must be encouraged. There is nothing inherently wrong in patents and copyrights; but patents, obviously, cannot be privately suppressed.

3. There must be free access to resources. Of course, there will be waste: note the misuses of our lands and some of our mineral deposits. But could our economy have moved to such great heights if there had been restrictions on their use? Conservation programs are in order when resources become scarce or synthetic substitutes do not emerge. But this is clear: limitation of production, to support prices, is the death of welfare rather than its advance. What to do if there is absolute overproduction, as in the case of cotton, for example? Retraining and redirection of cotton farmers are the answers here, with resulting improving standards of living and not the freezing of low ones.

4. The most important under this head of the "maintenance of opportunity" is the creation and defense of full educational facilities, so that talents can have the widest scope to develop and function.

Education, today, is the door to opportunity; it is a broad one, and it must be kept wide open. It is not the only one, of course, for traditional opportunity is not dead and never will be as long as our society continues to be a dynamic one and as long as new consumer demands are constantly appearing and real wages rise. New innovators regularly emerge, and little businesses, starting humbly, grow and flourish to compete with big business. Small retail stores become large department stores in one generation; a

single restaurant grows into a great chain; the amusement industry, notably, has made impressive strides because of the courage and imagination of individuals who started with small capital. The automobile industry—in the lifetime of many of us—could grow only because hundreds of little companies did the pioneering. Those that did survive reaped a rich harvest.

Yet it is largely true that in the area of industrial enterprise the opportunity of one hundred years ago—when the Carnegies, Rockefellers, Swifts, and Armours began their rise—no longer exists. Capital requirements are too great today for humble individuals to start as steelmasters, shipbuilders, and chemical manufacturers. In fact, more and more, as production moves into the tertiary stage of the service industries, the best that the bold and enterprising individual can look forward to is a managerial position in which a large income can be made but a private fortune, in the old sense, never accumulated. Further, more and more, because of the complex character of production and distribution and the growing significance of the service industries, our occupations are becoming white-collar occupations. The primary producer, the unskilled laborer, the undifferentiated owner-employer disappear; skills become more narrowly specialized and change, but we emerge—on the job, at any rate—as technicians. This is interesting; for the early fear of the machine was that it would make robots, or mechanical men, of us all. The reverse has happened, and our skilled crafts are constantly being augmented.

Because these are tendencies of the times, the opportunities through education in our industrial society are immense. Education disciplines the mind and makes possible the separation of the significant from the inconsequential, the true from the false; it gives the individual a set of enduring values and a box of tools with which to achieve them. It teaches him more how to handle a general problem than to do a particular task. It sets goals and reveals the means for their attainment. Through education, social usefulness and personal happiness are realizable.

The state must educate, therefore. How much? Certainly, it must create schools for all from infancy through adolescence, from nursery school through secondary school. And higher education? This, I believe, is the function of the free university, that is, the institution of higher learning where educational policies—admissions, curriculum, staff, library, and research programs—are under the complete and unrestricted direction of its faculties. Whether publicly or privately supported, such institutions should be on a fee basis. We are a wealthy nation, but not so rich as to be able to support all social services (education, health, housing, etc.) without reckoning their cost to the whole economy. Higher education should be paid for, and there should be sacrifice to obtain higher education.

When a young man or woman reaches the age of discretion, it is for him or her to decide whether higher education should be elected as one of many choices. Marriage might be one; a position with immediate income—to escape from parental restraint, perhaps—might be another; adventure through changing jobs might be a third. In any case, higher education must be accompanied by sacrifice: otherwise, it is too cheaply obtained and easily vulgarized. One sees today too many college curriculums where, in place of a rigorously devised educational scheme, there has been substituted a flaccid vocationalism. Students taking majors in domestic science, athletics, journalism, radio, and television—floating in the shallow, but wide, waters of an elective system—are wasting their time and the money of their parents and the public. They are not becoming better men and women; they are not learning those values—moral, humanistic, and scientific—on which the security of our free society is founded.

But what of the young person of real talents whose parents are of modest circumstance or whose earning powers must immediately be employed? Those who have great gifts—and tests can sort them out—should be the recipients of scholarships. Indeed, scholarships more and more should be the cornerstone of public policy as regards the support of higher education, with students exercising free choice as to the institutions they wish to attend. Again, I would require that only educators set the tests and that these be broadly based, particularly to measure reasoning powers. Giving scholarships on the basis of residence—so many to an assembly district, so many to a county—is an absurdity. Equally absurd is the granting of scholarships to those who have only good memories and therefore can commit to heart the contents of a few textbooks.

And what of those who are slower to mature intellectually and who also are held back by economic circumstance—the young men and women of good character, potential leadership, sound emotional adjustments? The sacrifices, here, would be perhaps greater. Employment will have to be sought, and education pursued at a slower pace. As these grow older and mature intellectually, the same opportunities for higher education must be established: we already have the device in our part-time colleges.

The School of General Studies of Columbia University is an example of such an institution. It is open only to adult men and women; its courses for the most part are given in the late afternoon and evenings; all its work is for university credit, and students may study for an undergraduate degree, take advanced courses toward graduate degrees, or pursue no degree sequence at all. Some thirty departments in Columbia University offer majors in the School of General Studies, and these are to be found in all the familiar fields—and some of the unfamiliar ones—of learning. To obtain a degree and before a major may be elected, a student must take what is tantamount to a general education program consisting of 12 points in English composition and literature, 12 points in the social sciences, 12 points in mathematics and the physical and natural sciences, and three years of a foreign language.

The students are adults in the sense that twenty years is the minimum age of admission, and most of them are employed. They are coming to college now—in a university atmosphere, working in a university curriculum and under university instruction—because at an earlier age they could not obtain scholarships or did not have independent financial resources.

But opportunity of this kind does not take care of all those who are capable of handling or who desire a college education. In our great urban communities there are still to be found thousands, perhaps tens of thousands, of young men and women who are employed but who—because of financial responsibilities—are unable to pay their way through a part-time college. For such, another type of scholarship might be created. For these young men and women, great industrial, mercantile, and financial organizations might be induced to set up so-called "industrial scholarships," given to people on the job, whose usefulness to their concerns and to society would be enhanced by general education. The educational process would take longer, of course; but the same goal ultimately would be achieved; for the part-time or evening college should place the same accent on liberal learning that the day college does.

There are other reasons why I am defining a free university in the way I have. I am concerned about the big state; notably, I am afraid of it as it affects liberal learning. The disaster that threatens the biological sciences in the Soviet Union indicates the brutality with which higher education can be controlled in a totalitarian society. The spirit of free inquiry at once withers and dies. But direction can take place subtly: in fact, in Britain,

fears are being expressed by university educators that the civil service examinations more and more are likely to take a pragmatic and vocational form. And when that occurs, the great classical and history schools of Oxford and Cambridge—where were trained the public administrators and officials of Britain—will be no more.

In the second place, if our free society is to survive, industry must assume a larger responsibility for the support of the free university. Our tax laws have made impossible the accumulation of great private fortunes: the Carnegies, Rockefellers, Harknesses, and Wideners, who built our great universities with their benefactions, have disappeared forever. Business leadership is in the hands of business corporations; and corporations are too close to their day-to-day problems and too sensitive, of course, to their obligations to their stockholders to permit them to assume a social responsibility. But they *must* develop one; and they must succeed the original captains of industry in their concern over higher education.

Attitudes must change first; the awareness that we are as good or as poor as our educated leadership must be widely diffused, if we are to face our problems with courage. Tax laws, too, must be overhauled to permit more and greater unrestricted contributions to our universities. Restricted gifts—for this or that piece of technical rather than pure research—are of little help to universities increasingly bewildered by problems of inadequate space, poorly paid faculties, and too few scholarships.

I get back to my basic assumption: that a free university is a fellowship of free scholars and free disciplines. The university teacher and scholar should feel free to participate fully in the community's life as a citizen and voter. He has, by and large, the same rectitude, devotion to principles, and sincerity that other members of the community possess. His participation in causes, popular or not, should carry only the same risk that others in nonacademic pursuits are willing to assume. He should, too, be willing to accept the judgment of his peers, of his fellow department and faculty members, as to his scholarly competence and community responsibilities. This is a simple enough definition of academic freedom; I cannot see how or why it should be restricted further.

Nevertheless, the academic person in America currently is under a cloud. His loyalty to our political society and to our economic arrangements seems to be suspect. This is a vicious canard. If some of our younger men and women in our universities are experimenting with new ideas, this is only because they are young and not because an academic environment breeds heresy and distrust. In any case, the heterodoxies of today often become the orthodoxies of tomorrow, in the social sciences as well as in religion.

I think the question must be viewed from a larger perspective. Why, in the United States, as nowhere else in the Western world, is the academic scholar a person of a somewhat inferior order? At what point in his career did he fall from that high estate he occupied in America one hundred years ago?

The descent began, I think, when he himself surrendered his confidence in the goals of a university education. When the university scholar adhered to the basic principles of liberal learning—to the disciplining of minds, to the acquisition of knowledge, to preoccupation with pure scholarship—he outranked the professions and industry in popular esteem. He still does in Great Britain and in France. But when more and more he placed the emphasis on an elective and eclectic discipline, when he began himself to talk of and advocate vocationalism as the basis of a university curriculum, when he began to develop nostrums and palliatives for government or industry—then he fell. A professor who invents or markets gadgets or who prepares newsletters for business information serv-

ices or who writes shoddy articles for popular magazines is only getting his just desserts. He makes money—and loses respect. Unhappily, all the professors suffer.

The rehabilitation of the professor in America is closely linked with the rehabilitation of the university curriculum. This is in process in many institutions. It is so, notably, in those which are free universities in the sense I have defined them. Boldness of thought, courage to advocate and carry out change, insistence upon first principles—these more and more are appearing. Such re-examinations of programs and curriculums are taking place within the faculties themselves. If we continue along these lines, we may expect the American scholar, in time, to reclaim his heritage.

The free university, in consequence, is at the basis of the free society. The free university picks its students and its fellowship of teachers; both are its own election. The free university devises its own curriculum. And as it returns to first principles—to the training of minds, the testing of values, and concern with liberal learning—more and more it will prove its right to leadership.

WHY TEACH HISTORY OF SCIENCE?

E. W. Strong

Our colleges and universities have much teaching of history in them, not only in the department devoted to Clio but throughout the humanities and social sciences. The one notable exception to the normal pattern of instruction, in which each major enterprise of our civilization has its history taught, is to be found in the natural sciences and their related technologies. No process, however, has been more momentous in the development of Western society than the career of science and technology in its impact upon all other spheres of human activity. What is being neglected in our educational practice in this slighting of history of science?

There are few, perhaps, who would question the desirability of having history of science form part of the education of students. There are many, however, who question President Conant's proposal to include history of science as instruction which a student may receive in partial satisfaction of undergraduate requirements in natural science.[1] Chief among the objectors are scientists. They recognize, of course, that they are indebted to predecessors for the fund of knowledge inherited from them; but this fund can be utilized without asking who these predecessors were, under what conditions they conducted their inquiries, and how they came to make their contributions. Possession of results by teacher or student suffices for competence in a natural science, subject to revisions in the light of further discoveries. This is to say that the method and content of a natural science as now constituted can be immediately presented in text and manual, lecture and demonstration. To know what a science was earlier in its development would indeed call for historical study; yet, if the aim of instruction in natural science is to convey the present state of knowledge to students, why make excursions into the past?

A defense of teaching science by way of its history can be made in arguments of effectiveness and appreciation. The argument of effectiveness asserts that students will more readily grasp results achieved in a science if cognizant of the questions which prompted investigation. Historical recapitulation follows paths of inquiry in their problems and hypotheses. It thus has value as an instrument

[1] James B. Conant, *On Understanding Science; An Historical Approach* (New Haven: Yale University Press, 1947), p. 16. "What I propose is the establishment of one or more courses at the college level on the Tactics and Strategy of Science. The objective would be to give a greater degree of understanding of science by the close study of a relatively few historical examples of the development of science." Science can be best understood by laymen, Conant contends, through such historical study rather than by logical analysis of scientific method: "for nine people out of ten the historical method will yield more real understanding of a complex matter" (p. 12).

The term "laymen," I take it, would apply to all students in a liberal arts college in their first two years and would continue to apply to a majority not going beyond a few beginning courses. In any event, knowledge in a science as at present constituted is no substitute for historical understanding of how a science has come to be as it is. Beginning courses devoted to a close study of a few relatively simple case histories open to all students and carrying science credit could well be followed by historical courses open only to students well advanced in a science major. History of science is not just teaching by examples but is perspective upon the scientific enterprise desirable in experts as well as in laymen.

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in introducing students to processes of invention and discovery by which a science makes its advances. Historical study has also an intrinsic value in affording an appreciation of the scientific enterprise in its conception of evidence and search for truth. Requirements of scientific method are brought home in review of controversies. A student learns not only the hypotheses that survived in their verifications to become incorporated in a system of knowledge but also those which were proved false and discarded. He comes thus to a better understanding of trial and error on the frontiers of knowledge.

Besides the arguments of effectiveness and appreciation just noted, a third reason can be given in answer to the question, "Why teach history of science in departments of science in our colleges and universities?" Arguments for and against the proposal to do so take a common notion of history for granted. History, for this notion, consists in relating events in sequences of occurrence and is thus the story of what happened. The story may begin and end in the past, or it may be brought down to the present. If the story is not brought down to the present, it portrays either some earlier stage of development later reconstituted or superseded or some contribution preserved intact within a growing body of knowledge. In the first instance, history presents the science as it was and not as it now is, hence not the body of knowledge which students need to know for proficiency. In the second instance, what the history makes known in fact and law can be known independently, since every science systematizes such knowledge not in how it came to be acquired but in its content as subsumed under principles. If the story is brought down to the present, it will bring students nearly abreast of scientific progress; but, since further history is being made even as the history is written, that history needs continually to be supplemented and eventually to be rewritten. The task of the historian is that of recording contributions to science, whereas the task of the scientist is to utilize contributions, especially those now being made, in his own teaching and research.

The conception of history as consisting essentially of a record of past events and achievements leads to the contrast, even the opposition, between science as recorded and science as utilized. Yet such conception, while unexceptionable as far as it goes, falls far short of the *raison d'être* of history—a reason which argues also for the indispensability of history of science for scientists. No man writes history for the past. Histories are written for present and future readers, and written to the questions and problems that arise in a living present. The requirements of an actual situation within which a man lives furnish the interests and concerns of his historical inquiry in its initiation. Thus men do not write economic histories and economic interpretations of past performance until the situation in which they live gives rise to economic questions having an urgency not felt before. It is then that they explore a past range of human experience for the light which knowledge of the past may shed upon affairs in which they are currently engaged. History is always an appropriation of the past to a living present in the act of thought involved; otherwise, one has a mere anecdote or chronicle with which to while away an hour. National histories take on a new character with the rise of the nation-state as a new pattern of social existence politically organized. History of civilizations begins to be written with the colonial expansion of nation-states in attempts to make out what is implicated in the contrast between European culture and the cultures of other societies. The work of historical reconstruction and representation is frequently, if not always, traceable to an urgency of contemporary affairs which brings men to consider the question of how the present has come to be as it is or the question of comparability between what now exists and what existed in the past.

The scientists of Newton's day were conscious that their inquiry aroused suspicions stemming from religious beliefs and doctrines. Newton himself wrote his famous General Scholium at the end of Book III of the *Principia* at the urging of Cotes, the editor of the second edition (1713). Cotes was disturbed by the criticism of the *Principia* which Liebniz had made, to the effect that it presented a system of the world without God and hence had left out an element essential to the discomfiture of atheists. Newton responded to Cotes's suggestion that he "say something" in reply by asserting his belief, earlier expressed in the *Optice* (1706), that there is an "intelligent Agent" without whom the world would not have been constituted in its order—an order from which one may argue for the existence of a Diety well skilled in geometry and mechanics. Yet Newton makes clear the autonomy of science in its own procedures and results. Pemberton[2] and Maclaurin,[3] as do some other expositors of Newton's science for the instruction of students and laymen, introduce their expositions by historical accounts of scientific thought and discovery leading up to Newton's achievements. It was not simply concern for knowledge of the past, as this would contribute to the sum of human knowledge which led them to write these introductions. Rather, it was concern for a right understanding of science as a human enterprise in the setting of contemporary dangers to its acceptance and pursuit that prompted them to treat of history of science as an ingredient in the instruction of students to further a correct understanding of the work in which they were engaged. These expositors did not confuse the problems within a science, to be handled by the techniques of scientists, with problems of knowledge about past happenings, to be solved by the techniques and investigations of historians. But they were aware, as they could not help being under the brunt of attack from philosophers and theologians, that the ongoing enterprise was under suspicion. Where men are concerned for the future of their work, they take thought of the past out of which it has come to a present stage of competence and authority. By so doing, they make clear to themselves and others what is involved in the enterprise and at stake in its pursuit. They come to know what they are about, for one who knows only the present enterprise knows not even that. He has knowledge within his science or discipline but lacks comprehension of the role of his endeavors within his culture as a historical phenomenon over time.

An opponent of the proposal to teach science through its history could enter a protest at this point. "I do not quarrel," he could say, "with your defense of a cultural value of history of science. You need not defend it against me, for I have no intention of attacking it. I maintain only that cultural value is not to be confused with the province of science proper. Let history of science be taught, if you will, so long as it is not supposed

[2] Henry Pemberton, *A View of Sir Isaac Newton's Philosophy* (London, 1728), pp. 1–26: "And as Galileo has shewn more fully, than was known before, what effects were produced in the motion of bodies by their gravitation towards the earth; so Sir Isaac Newton . . . has much advanced our knowledge in the celestial motions." After brief mention of astronomical discoveries made by Newton, Pemberton continues: "Doubtless it might be expected, that such surprising success should have silenced, at once, every cavil. But we have seen the contrary. For because this philosophy professes modestly to keep within the extent of our faculties, and is ready to confess its imperfections, rather than to make any fruitless attempts to conceal them by seeking to cover the defects in our knowledge with the vain ostentation of rash and groundless conjectures; hence has been taken an occasion to insinuate that we are led to miraculous causes, and the occult qualities of the schools" (pp. 17–18).

[3] Colin Maclaurin, *An Account of Sir Isaac Newton's Philosophical Discoveries* (London, 1775), chaps. ii–iv. "An entire liberty must be allowed in our enquiries, that natural philosophy may become subservient to the most valuable purposes, and acquire all the certainty and perfection of which it is capable: but we ought not to abuse this liberty by *supposing* instead of *enquiring*, and by imagining systems, instead of learning from observation and experience the true constitution of things" (pp. 5–6).

that this is a substitute for instruction within a science or a better way of providing knowledge in science for general students, let alone for those students whom we are preparing for scientific work. We must be practical, in any case, in this matter. There are just so many units of work which a student can undertake and just so many years which he can devote to his preparation. Some history rather than none or a lot of history rather than a little may be a fine thing to acquire in an education, but first things have to be placed first. If we are to have general students knowing some science instead of just knowing something about science and if, beyond that, we are to have specialized students thoroughly trained in science, then we must get in as much work in science as time permits. Our primary job is to teach science within the sciences as they are now constituted, and not out of history of past exploits. If one can afford a luxury, I would not deny him the pleasure; but history of science is a luxury and not an essential for scientists in their work."

The objection asserts that we must be practical. I agree. More than that, I would insist that it is just the seriousness of practical requirements which provides situation and occasion for history of science. A third argument for histories of science as courses of instruction in our colleges and universities, beyond the arguments of effectiveness and appreciation, calls attention to the existence of problems directly affecting the pursuit of science, problems which cannot be met without historical knowledge. I suppose, in short, that men concerned with work in a science are, or should be, also concerned with the conditions under which scientific work is furthered or obstructed. I would not question that the practical requirements in the immediate foreground are those of instruction in science or suppose that history of science could be a substitution. What I do question is the notion that the historical study can be omitted without serious practical consequences.

The peril to science from the side of religion was dissipated in the eighteenth-century Enlightenment in the struggle for free thinking. When Auguste Comte, in the next century, set forth the three stages of man's intellectual development as the progress from theological belief through metaphysical reasoning to positive science, he was confirming in a systematic interpretation of history the prevailing conviction in the secure present and unclouded future of free investigation devoted to objective verification of propositions about nature and society. The notion of a guaranteed future of sciences persisted throughout the nineteenth century. The situation was one of confident optimism and carried a not surprising consequence. Where no serious challenge arises with regard to the future of present and ongoing enterprise, there is no occasion for scientists to take historical stock of the past to which their current activities are beholden. History of science ceased, in the main, to be of concern to scientists at the same time that historians, desiring to be scientists in their work, decided that establishing facts was their business, to the neglect of theory and interpretation. Historians slighted their role of enlightening by interpretation concurrent with the specialization in sciences which divorced itself from historical considerations. Academic minds slumbered when they should have been vigilant about freedom of inquiry. Education in the universities had been freed from religious domination by the separation of church and state. That the state, in turn, would imperil free scientific inquiry in the twentieth century was hardly foreseen, although John Stuart Mill, in his defense of liberty of thought and discussion, did envisage dangers to freedom from political coercion and warned against them.[4] The actualization

[4] Mill was especially concerned in his essay *On Liberty* with the "tyranny of the majority" (i.e., with the "interference of collective opinion with individual independence"); but he points out, in chap. i, how the "yoke of opinion" becomes the yoke of law. If those in the majority feel the power of government to be their power

of those dangers in Germany, Italy, and the Soviet Union we know, and we have now to reckon with them within our own country.

Irrationalism and religious obscurantism we have always with us, but these seem not now to be major dangers to pursuit of science. The policing of scientists by the state in our day is a far more serious matter. Do we hope that our schools have been so successful in the education of students in the method and spirit of science that there is now a large and influential body of citizens who comprehend the need and values of protecting the domain of free inquiry against political or other dictation? Has our instruction in science been such that it would normally have engendered such comprehension? Or would we rather have to admit some measure of failure in instilling an understanding of the human values of science and the conditions requisite to preserving them? The subject matter of a natural science is not man's culture and its values. Yet the values of science are human values: those of satisfaction in knowing the constitution and processes of the physical world and of a greater mastery of material conditions leading to adjustments and controls for the betterment of human life. Men had to learn over many centuries that nature, to be commanded, must first be obeyed if they were to achieve sciences of things as they are and not as religious faith would have them be. That is to say that they had to learn to be exact observers and unbiased examiners of nature and, in this, to get clear of speculative apologies and rationalizations which rendered the world nearer to the heart's desire. Yet how are our students to know this if they know not history of science?

Those who go far in any science become more or less cognizant of the past of their science in relation to its present. The majority of our students go no further than beginning courses in natural science. Understanding unconveyed by the sciences as they are taught will not be caught by contagion from an instructor who is himself cognizant of historical significance but uncommunicative. No one doubts that a science is learned by doing it. I know of no art, skill, or discipline that can be acquired and mastered without having the learner become a practitioner in it. One would be blinking at the obvious if he argued to the contrary. I suppose that we have a laboratory requirement for our students for one main reason, namely, that, even if this is all they ever have, they will at least have had an inkling of practice. While this is all to the good, I fear that our science instruction has largely neglected the task of engendering an enlightened comprehension of the place and role of science in our society. It has too narrowly conceived its responsibility for informing

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or its opinions their opinions, then individual liberty "will probably be as much exposed to invasion from government as it already is from public opinion" (p. 8). Mill remarks that there is already "an increasing inclination to stretch unduly the power of society over the individual, both by force of opinion and even by that of legislation; and as the tendency of all the changes taking place in the world is to strengthen society, and diminish the power of the individual, this encroachment is not one of the evils which tend spontaneously to disappear, but, on the contrary, to grow more and more formidable" (p. 12). In chap. v, Mill argues that the most cogent reason for restricting the interference of government is the great evil of adding unnecessarily to its power —a power which grows by locating more and more functions in the hands of a bureaucracy. "Where everything is done through a bureaucracy, nothing to which the bureaucracy is really adverse can be done at all. The constitution of such countries is an organisation of the experience and practical ability of the nation into a disciplined body for the purpose of governing the rest; and the more perfect the organisation is in itself . . . the more complete is the bondage of all, the members of the bureaucracy included. For the governors are as much the slave of their organisation and discipline as the governed are of the governors" (p. 101). (Page references are to the edition of *On Liberty*, edited by R. B. McCallum and published by Basil Blackwell [Oxford, 1946].) In another essay, "M. de Tocqueville on Democracy in America," in *Dissertations and Discussions* (New York, 1847), II, 158, Mill writes: "It is not the uncontrolled ascendency of popular power, but of any power, which is formidable."

students of the conditions under which scientific work is furthered, by limiting conception to techniques and neglecting historical and social conspectus.

If this conclusion just stated be questioned, it can be tested in the following way. Let us set for all students at the end of their sophomore year in college the following task. Let us have them write an essay in which they are asked to set down (1) the instruction they have received in the natural sciences, (2) what they understand to be the method and aim of science, and (3) what the place and value of scientific investigation is within and for our civilization. Finally, let us ask them in what ways and how far the instruction they have received in the natural sciences has contributed to comprehension of method, aim, place, and value of scientific inquiry and its results in our society.

It is the task of many departments and not of science departments alone to contribute, each according to its ability and subject matter, to the comprehension which we would desire students to exhibit in answer to such questions. A miserable performance would reflect upon literature, history, social sciences, and philosophy, for it would indicate neglect in these areas of the major cultural phenomena of natural science as its effects and consequences have spread throughout our intellectual and practical life. The responsibility is conjoint. The marriage, however, is no sooner proposed than repudiated. When one attempts to lay history of science upon the doorstep of the scientists, many deny that it is a legitimate issue of science and reject it as an unwanted foundling. When one tenders the babe to the historians in the hope that they may see fit to adopt it in their curriculum, they plead inability to nourish the stranger. Philosophers have served as wet nurses, but their suckle has been mainly method and theory of knowledge. Acknowledged parents are still wanting in a matrimonial bond of history and science. Meanwhile, students remain too much in ignorance of the historical career of science through default of instruction within colleges and universities.

I would be more worried than I am about the neglect of history of science in teaching did not events in history-in-the-making suggest imminence of remedy. Fifteen years ago there was not a single course, to my knowledge, offered in any university in this country concerned with the philosophy of history. The literature in the field published since that time has been voluminous, and courses have sprung up in many institutions. The seriousness of a practical situation was responsible. It became clear that our society was committed to an interpretation of history in the theory of liberalism, once opposed interpretations had arisen which challenged and repudiated it. The peril of opposed interpretations was their consequence in practice in becoming guides for the exercise of state power. The time had come to take stock.

I venture to predict a comparable rise of instruction in the history of science. When we see that it is perilous, practically, to neglect history of science, we will no longer neglect it. The ferment now stirring is yeast from which we will have a loaf in the future. However, it takes recipe and baker to produce the loaf. Where we now ask whether or not there should be any loaf at all, I predict that we will eventually be asking how to undertake the baking. We may do some botching while we learn how. Our initial difficulty is to get bakers where none were practicing before. The obstacle can be surmounted, once we are convinced that it should be. Our past neglect is our present hindrance in shaping a future that we may now decide needs to be shaped. Once we grasp the problem as one we need to deal with, our practice can then be such that it works toward a solution of it. I suggest that our problem is not that of the viability of history of science. Our problem is how we are to establish it as part of the instruction in science to be given to our students.

THE SIGNIFICANCE OF THE NEWTONIAN SYNTHESIS

Alexandre Koyré

It is obviously utterly impossible to give, in the brief space of one paper, a detailed history of the birth, growth, and decay of the Newtonian world view. It is just as impossible even to give a reasonably complete account of the work performed by Newton himself. Thus, by necessity, I am obliged to restrict myself to the very essentials and to give you the barest outline of the subject. Moreover, in doing so I will assume a certain amount of previous knowledge. It is, I believe, a legitimate assumption, because, as a matter of fact, we all know something about Newton. Much more, doubtless, than we know about any of the other great scientists and philosophers whose common effort fills the seventeenth century—the century of genius as Eddington and Whitehead have called it.

We know, for instance, that it is to Newton's insight and experimental genius —not *skill:* others, for instance, Robert Hooke, have been just as skilled, or even more so than he—that we owe the idea of decomposition of light and the first scientific theory of spectral colors;[1] we know that it is to his deep philosophical mind that we owe the formulation—though not the discovery—of the fundamental laws of motion[2] and of action, together with the clear understanding of the method and meaning of scientific inquiry; that it was his invention of the calculus that enabled him to demonstrate the identity of terrestrial and celestial gravitation and to find out the fundamental law of attraction that binds—or at least until recently bound—together the smallest and the largest bodies—stars and atoms—of the infinite universe. Though, of course, it is not to him, but to his great rival Leibniz,[3] that we owe *de facto* the actual spread and development of the infinitesimal calculus without which the gradual extension and perfection of the Newtonian *Systema mundi* would be impossible.

[1] The production of spectral colors by crystals had been known even in antiquity; in the seventeenth century they had been studied by M. A. de Dominis, *De radiis lucis in vitris perspectivis et iride tractatus* (Venice, 1611); Marcus Marci, *Thaumanthias, liber de arcu cœlesti deque colorum apparentium* (Prague, 1648); F. M. Grimaldi, *Physico-mathesis de lumine, coloribus et iride aliusque annexis* (Bologna, 1665); and especially by Robert Boyle, *Experiments and Considerations Touching Colours* (London, 1663), and Robert Hooke, *Micrographia* (London, 1665). To Newton belongs not the discovery of the phenomenon, but (1) the application of exact measurements to its study and (2) its explanation as a decomposition (and recomposition) of white light into its colored components by the prism, in contradistinction to the pre-Newtonian conception that explained the appearance of the spectral colors by a *processus* of qualitative change suffered by white light in its passage through a prism.

[2] The laws of motion owe their discovery to Galileo and Descartes. Cf. my *Études Galiléennes* (Paris, 1939).

[3] Nobody doubts today the complete independence of Leibniz' invention of the differential calculus; nobody has ever doubted the superiority of the Leibnizian symbolism. Therefore, it is very interesting to note that Hadamard believes it to be just as inferior to the Newtonian one as the conception of the "differential" is to that of the "fluxion" (cf. Jacques S. Hadamard in the Royal Society of London, *Newton Tercentenary Celebration* [Cambridge: At the University Press, 1947]).

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Besides, all or at least most of us have been born and bred—or better and more exactly, not *born* (as this is impossible) but only *bred*—in the Newtonian world, and we have nearly all accepted the idea of the Newtonian world machine as the expression of the true picture of the universe and the embodiment of scientific truth. This because for more than two hundred years such has been the common creed of modern science and of enlightened mankind.

Thus it seems to me that I have the right to assume that when we are speaking about Newton and Newtonianism we know more or less what we are speaking of. More or less! Somehow this very expression used in connection with Newton strikes me as improper. This because it is possible that the deepest meaning and aim of Newtonianism, or rather, of the whole scientific revolution of the seventeenth century, of which Newton is the heir and the highest expression, is just to abolish the world of the "more or less," the world of qualities and sense-perception, the world of appreciation of our daily life, and to replace it by the (Archimedean) universe of precision, of exact measures, of strict determination.

Let us dwell for a moment upon this revolution, one of the deepest, if not the deepest, mutations and transformations accomplished—or suffered—by the human mind since the invention of the cosmos by the Greeks, two thousand years before.[4] This revolution has been described and explained—much more explained than described—in quite a number of ways. Some people stress the role of experience and experiment in the new science, the fight against bookish learning, the new belief of modern man in himself, in his ability to discover truth by his own powers, by exercising his senses and his intelligence, so forcefully expressed by Bacon and by Descartes, in contradistinction to the formerly prevailing belief in the supreme and overwhelming value of tradition and consecrated authority.

Some others stress the practical attitude of modern man, who turns away from the *vita contemplativa*, in which the medieval and antique mind allegedly saw the very acme of human life, to the *vita activa* and who therefore is no longer able to content himself with pure speculation and theory; who wants a knowledge that can be put to use: a *scientia activa, operativa* as Bacon called it; or as Descartes has said, a science that would make man master and possessor of nature.[5]

The new science, so we are told sometimes, is the science of the craftsman and the engineer, of the working, enterprising, and calculating tradesman—in fact, the science of the rising bourgeois classes of modern society.[6]

[4] Cf. my "Galileo and the Scientific Revolution of the Seventeenth Century," *Philosophical Review*, LII (July, 1943), 333–48.

[5] Philosophers are often inclined to overvalue the importance of philosophical teaching and—when dealing with the past—to forget that, as often as not and even more often than not, philosophical (and religious) teachings are not so much *expressing* as *opposing* the prevailing trends of their time.

[6] The psycho-sociological explanations of the rise of modern science present us usually with a mixture of two by no means equivalent theories: (1) modern science is the offshoot of the technical development of the sixteenth and seventeenth centuries; it was made by technicians, civil and especially military, engineers (Leonardo, Stevinus), by the *proti* of the Arsenal of Venice, etc.; and (2) modern science is made by scientists who, because of the increasing importance of technics and the growing importance of the bourgeoisie in the sixteenth and seventeenth centuries, started thinking about problems of industry that they had persistently neglected since Archimedes' time. Both these theories seem to me to miss (1) the role of purely theoretical interest in mathematics which led to—and was maintained by—the rediscovery of Greek science, and (2) the overwhelming importance of the study, and the autonomous evolution, of astronomy. Besides, they forget that mathematicians and astronomers (not to speak of experimental physicists) need money as much as (or even more than) theologians and jurists and are therefore likely to stress the practical value of their work in order to "sell" their science to wealthy and ignorant patrons. This kind of propaganda is by no means a feature of the twentieth century: it

There is certainly some truth in these descriptions and explanations: it is clear that the growth of modern science presupposes that of the cities. It is obvious that the development of firearms, especially of artillery, drew the attention to problems of ballistics; that navigation, especially that to America and India, furthered the building of clocks, etc.; yet I must confess that I am not satisfied with them. I do not see what the *scientia activa* has ever had to do with the development of the calculus; or the rise of the bourgeoisie with that of the Copernican, or the Keplerian, astronomy. And as for experience and experiment—two things which we must not only distinguish but even oppose to each other—I am convinced that the rise and growth of experimental science is not the source but, on the contrary, the result of the new *theoretical*, that is, the new *metaphysical*, approach to nature that forms the content of the scientific revolution of the seventeenth century, content which we have to understand before we can attempt an explanation (whatever this may be) of its historical occurrence.

I shall therefore characterize this revolution by two, narrowly connected and even complementary, features: (1) the destruction of the cosmos, and therefore the disappearance from science—in principle if not always in fact—of all considerations based on this concept;[7] (2) the geometrization of space, that is, the substitution of the homogeneous and abstract—now considered as real—dimension space of the Euclidean geometry, for the concrete and differentiated place-continuum of pre-Galilean physics and astronomy.

As a matter of fact, this characterization is very nearly equivalent to the following one: mathematization (geometrization) of nature and therefore mathematization (geometrization) of science.

The disappearance, or destruction, of the cosmos means that the world of science, the real world, is no more seen or conceived as a finite and hierarchically ordered, therefore qualitatively and ontologically differentiated, whole but as an open, indefinite, and even infinite universe, united not by its immanent structure but only by the identity of its fundamental contents and laws. A universe in which, in contradistinction to the traditional conception with its separation and opposition of the two worlds of becoming and being, that is, of the heavens and of the earth, all its components appear as placed on the same ontological level; a universe in which the *physica cœlestis* and *physica terrestris* are identified and unified, in which astronomy and physics become interdependent and united because of their common subjection to geometry.[8]

This, in its turn, implies the disappearance—or the violent expulsion—from scientific thought of all considerations based on value, perfection, harmony, meaning, and aim, because these concepts, from now on *merely subjective*, cannot have a place in the new ontology. Or, to put it in different words, all formal and final

had already begun in the sixteenth. It is chiefly to his skill and value as propagandist for endowments that Bacon owed his popularity among the seventeenth- and eighteenth-century scientists. The psycho-sociological (Marxist and semi-Marxist) theory is to be found at its best in, among others, B. Hessen, "The Social and Economic Roots of Newton's *Principia*," in *Science at the Cross-roads: Papers Presented to the International Congress of the History of Science and Technology Held in London, 1931*, by the delegates of the U.S.S.R. (London: Kniga, 1931); and E. Zilsel, "The Sociologial Roots of Science," *American Journal of Sociology*, XLVII (January, 1942), 544–62. For criticism see, among others, G. N. Clark, *Science and Social Welfare in the Age of Newton* (2d ed.; Oxford: Oxford University Press, 1949).

[7] As we shall see, Newtonian science, or at least the Newtonian world-view, asserted the purposeful character of the world (solar system). It *did not* explain its features by deducing them from a purpose. Kepler still used this pattern of explanation.

[8] Cf. my "Galileo and Plato," *Journal of the History of Ideas*, IV (October, 1943), 400–428.

causes as modes of explanation disappear from—or are rejected by—the new science and are replaced by efficient and even material ones.[9] Only these latter have right of way and are admitted to existence in the new universe of hypostasized geometry, and it is only in this abstract-real (Archimedean) world, where abstract bodies move in an abstract space, that the laws of being and of motion of the new—the classical—science are valid and true.

It is easy now to understand why classical science—as has been said so often—has substituted a world of quantity for that of quality. Just because, as Aristotle already knew quite well, there are no qualities in the world of numbers or in that of geometrical figures, there is no place for them in the realm of mathematical ontology.

And even more. It is easy now to understand why classical science—as has been seen so seldom—has substituted a world of being for the world of becoming and change: just because, as Aristotle has said, too, there is no change and no becoming in numbers and in figures.[10]

But, in doing so, it was obliged to reframe and to reformulate its fundamental concepts, such as those of matter, motion, and so on.

If we take into account the tremendous scope and bearing of this so deep and so radical revolution, we shall have to admit that, on the whole, it has been surprisingly quick.

It was in 1543—one hundred years before the birth of Newton—that Copernicus wrested the earth from its foundations and hurled it into the skies. It was in the beginning of the century (1609 and 1618) that Kepler formulated his laws of celestial motions and thus destroyed the orbs and spheres that encompassed the world and held it together; he did it in the same time in which Galileo, creating the first scientific instruments and showing to mankind things that no human eye had ever seen before, opened to scientific investigation the two connected worlds of the infinitely great and of the infinitely small.

Moreover, it was by his "subjecting motion to number" that Galileo cleared the way for the formulation of the new concepts of matter and motion I have just mentioned, that formed the basis of the new science and cosmology. Concepts with the aid of which—identifying matter and space—Descartes, in 1637, tried, and failed, to reconstruct the world; concepts that—redistinguishing between matter and space—Newton so brilliantly, and so successfully, used in his own reconstruction.

The new concept of motion which so victoriously asserts itself in the classical science is quite a simple one. So simple that, although very easy to use—once one is accustomed to it, as we all are—it is very difficult to grasp and fully to understand. Even for us. I cannot analyze it

[9] It has often been said that modern science is characterized by the renunciation of the research of causes and restriction to that of laws. Yet, as has been shown by P. Duhem, *La Théorie physique* (2d ed.; Paris, 1914), the slogan *σώζειν τὰ φαινόμενα* ["to save the phenomena"] is by no means modern; it is that of Greek and even medieval astronomy. On the other hand, as has been conlusively shown by E. Meyerson, *Identité et réalité* (3d ed.; Paris, 1926) and *De l'explication dans les sciences* (Paris, 1922), this renunciation has always been temporary, and scientific thought has always attempted to penetrate behind the laws and to find out the *mécanisme de production* of the phenomena. I could add that, on the one hand, it was just the research of causal laws of the celestial motions which led Kepler to his "New Astronomy" conceived as "Celestial Physics," and, on the other hand, that the absence of any theory of gravity led Galileo to the erroneous conception of gravitation as constant force.

[10] Thus Newton's *Optics* denies the existence of any qualitative change in the light passing through a prism: the prism acts only as a sieve; it disentangles a mixture and sorts out the different rays, already present as such, which compose the white light. The experiment, as does every good experiment, according to Newton, reveals something which is already there. It does not produce anything new.

here,[11] yet I would like to point out that, as Descartes quite clearly tells us, it substitutes a purely mathematical notion for a physical one and that, in opposition to the pre-Galilean and pre-Cartesian conception which understood motion as a species of becoming, as a kind of process of change that affected the bodies subjected to it in contradistinction to rest, which did not, the new—or classical—conception interprets motion as a kind of being, that is, not as process but as a status, a status just as permanent and indestructible as that of rest and which no more than this latter affects the bodies that are in motion. Being thus placed on the same ontological level, being deprived of their qualitative distinction, motion and rest become indistinguishable.[12] Motion and rest are still—and even more than ever—opposed to each other, but their opposition becomes a pure correlation. Motion and rest do not any more exist in the bodies themselves; bodies are only in rest or in motion in respect to each other, or to the space in which they exist, rest, and move; motion and rest are relations, though, at the same time, they are considered as *states*. It is this conception (of the inner difficulties of which Newton had been doubtless quite aware) that carries—and perhaps undermines—the magnificent structure of classical science, and it is about this motion that in his famous first law or axiom Newton tells us that *corpus omne perseverare in statu suo quiescendi vel movendi uniformiter in directum nisi quatenus a viribus impressis cogitur statum illum mutare*.[13]

The motion dealt with in this law is not the motion of the bodies of our experience; we do not encounter it in our daily lives. It is the motion of geometrical (Archimedean) bodies in abstract space. That is the reason why it has nothing to do with change. The "motion" of geometrical bodies in geometrical space changes nothing at all, the "places" in such a space are equivalent and even identical. It is a changeless change, if I may say so, a strange and paradoxical blending together of the same and the other that Plato tried—and failed—to effect in his *Parmenides*.

The transformation of the concept of motion by substituting for the empirical concept the hypostasized mathematical one is inevitable if we have to subject motion to number in order to deal with it mathematically, to build up a mathematical physics. But this is not enough. Vice versa, mathematics has to be transformed (and to have achieved this transformation is the undying merit of Newton). Mathematical entities have to be, in some sense, brought nearer to physics, subjected to motion, and viewed not in their "being" but in their "becoming" or in their "flux."[14]

The curves and figures of geometry have to be seen and understood, not as built up of other geometrical elements, not as cut out in space by intersection of geometrical bodies and planes, or even as presenting a spatial image of the struc-

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[11] Cf. my *Études Galiléennes*.

[12] The equivalence of motion and rest is asserted by Descartes *expressis verbis*. In the Newtonian physics *relative* motion and rest are equivalent; *absolute* motion and rest, of course, are not. Unfortunately, they remain undistinguishable, at least for us, if not for God.

[13] "Every body continues in its state of rest, or of uniform motion in a right line, unless it is compelled to change that state by forces impressed upon it" (Isaac Newton, *Mathematical Principles of Natural Philosophy*, Law I, in Florian Cajore [ed.], *Sir Isaac Newton's Mathematical Principles of Natural Philosophy and His System of the World*, translated into English by Andrew Motte in 1729 [Berkeley: University of California Press, 1934], p. 13). According to this law, whereas motion is a status, acceleration is a change. Circular motion, being an accelerated one, is, therefore, easily recognizable and distinguishable from rest. Ernst Mach, in his famous criticism of Newton, seems to have overlooked this simple fact (cf. *The Science of Mechanics*, trans. Thomas J. McCormack [La Salle, Ill.: Open Court, 1942], pp. 276–85).

[14] Cf. Hadamard, *op. cit.*, and Carl B. Boyer, *The Concepts of the Calculus* (New York: Columbia University Press, 1939).

tural relations expressed in themselves by algebraic formulas, but as engendered or described by motion of points and lines in space. It is a timeless motion, of course, that we are here dealing with or, even stranger, a motion in a timeless time. A notion as paradoxical as that of changeless change. Yet it is only by making changeless change proceed in timeless time that we can deal—effectively as well as intellectually—with such realities as speed, acceleration, or direction of a moving body in any point of its trajectory; or vice versa, at any moment of the motion describing that trajectory.

It is a thrilling story, the story of the successful and unsuccessful efforts of the human mind to formulate these new and strange ideas, to build up, or as Spinoza so pregnantly has said, to *forge* the new tools and patterns of thinking and of understanding. It fills the fifty years that separate the *Discourse on Method* from the *Principia mathematica.* A series of great thinkers—to mention only Fermat and Cavalieri, Pascal and Wallis, Barrow and Huygens—have made their contribution to the final success, and without them the *Philosophiae naturalis principia mathematica* would not have been written; the task would have been too arduous, even for Newton *qui genus humanum ingenio superavit.*

Thus, modifying somewhat the celebrated statement of Newton made in his famous letter to Robert Hooke, we could, with truth, say that, if Newton saw as far as he did, and so much farther than anybody had seen before him, it was because he was a giant standing on the shoulders of other giants.

The physico-mathematical current I have just been sketching is certainly the most original and most important trend of seventeenth-century scientific thought. Yet, parallel to it there runs another one, less mathematical, less deductive, more empirical and experimental. Being less pretentious (or more diffident), it does not attempt the sweeping generalizations of the mathematicians. It views them with misgiving and even with hostility, and it restricts itself to the discovery of new facts and to the building-up of partial theories explaining them.

This current is inspired not by the Platonic idea of the mathematical structure and determination of being, but by the Lucretian, Epicurean, Democritean conception of its atomic composition (as strange as it may seem, most modern ideas lead back to some old Greek fancy). Gassendi, Roberval, Boyle—the best representative of their group—Hooke: they all oppose the more timid, more cautious, and more secure *corpuscular philosophy* to the pan-mathematism of Galileo and Descartes.

Thus when Galileo tells us that the book of nature, that book in which the medieval mind perceived the *vestigia* and the *imagines Dei* and read the glory of God expressed in sensible symbols of beauty and splendor revealing the hidden meaning and aim of the creation, was, in truth, written in geometrical characters, in circles, triangles, and squares, and only told us the intellectually marvelous story of rational connection and order, Boyle protests: the book of nature, said he, was certainly "a well contrived romance" of which every part, "written in the stenography of God's omniscient hand," stood in relation to every other; but it was written not in geometrical, but in *corpuscular* characters.

Not mathematical structure but corpuscular texture formed for him the inner reality of being. In the explanation of the universe we have to start with—or stop at—matter. Not homogeneous Cartesian matter, but matter already formed by God into various, diversely determined corpuscles. These are the letters which motion forms into the words of the divine romance.

Looking at things from this perspective, we see quite clearly that Newton presents us with a synthesis of both trends, of both views. For him, just as for Boyle, the book of nature is written

in corpuscular characters and words. But it is, just as for Galileo and Descartes, a purely mathematical syntax that binds them together and gives its meaning to the text of the book.

Thus, in contradistinction to the world of Descartes, the world of Newton is conceived as composed not of two (extension and motion) but of three elements: (1) *matter,* that is, an infinite number of mutually separated and isolated, hard and unchangeable—but not identical—particles; (2) *motion,* that strange and paradoxical relation-state that does not affect the particles in their being but only transports them hither and thither in the infinite, homogeneous void; and (3) *space,* that is, this very infinite and homogeneous void in which, unopposed, the corpuscles (and the bodies built of them) perform their motions.[15]

There is, of course, a fourth component in that Newtonian world, namely, attraction, which binds and holds it together. Yet this is not an *element* of its construction: it is either a hyperphysical power—God's action—or a mathematical stricture that lays down the rule of syntax in God's book of nature.[16]

The introduction of the void—with its correlative, attraction—in the world view of Newton, in spite of the tremendous physical and metaphysical difficulties involved by this conception (action at a distance; existence of the nothing) has been a stroke of genius and a step of decisive importance. It is this step that enabled Newton to oppose and unite at the same time—and to do it *really* and not *seemingly* like Descartes—the discontinuity of matter and the continuity of space. The atomic structure of matter, emphatically asserted, formed a firm basis for the application of mathematical dynamics to nature.[17] It yielded the *fundamenta* for the relations expressed by space. The cautious corpuscular philosophy did not really know what it was doing. But, as a matter of fact, it had been only showing the way to the Newtonian synthesis of mathematics and experiment.

The void, action through the void, action at a distance (attraction): it is against these features and implications of the Newtonian world-view that the opposition of the great continental contemporaries of Newton—Huygens, Leibniz, Bernoulli—well trained in the Cartesian rejection of unclear and unintelligible ideas, was directed.[18]

In his famous, brilliant *Lettres anglaises*—readable even today—Voltaire very wittily sums up the situation: a Frenchman who arrives in London finds himself in a completely changed world. He left the world *full;* he finds it *empty.* In Paris the universe is composed of vortices of subtle matter; in London there is nothing of that kind. In Paris everything is explained by pressure, which nobody understands; here by attraction, which nobody understands either.

Voltaire is perfectly right: the Newtonian world is chiefly composed of void.[19] It is an infinite void, and only a very small part of it—an infinitesimal part—is filled up, or occupied, by matter, by bodies which, indifferent and unattached, move freely and perfectly unhampered in—and through—that bound-

[15] Space for Newton (as for Henry More or as for Thomas Bradwardine) is the eternal realm of God's presence and action—not only his sensorium but also, if one may say so, his actorium.

[16] As a matter of fact, it is both: a hyperphysical power acting according to a strict mathematical law.

[17] The physics of central forces necessarily involves an atomic structure of matter.

[18] The criticism of the conception of attraction had already been made, once and for all, by Descartes, who pointed out that, in order to be able to attract body B, body A should *know* where to find it. Attraction, in other words (as William Gilbert recognized without considering it an objection), involves animism.

[19] Not only are the heavenly spaces empty and void, but even the so-called "solid bodies" are full of void. The atoms are by no means closely packed together but are separated from one another by void space.

less and bottomless abyss. And yet it is a world and not a chaotic congeries of isolated and mutually alien particles. This, because all of these are bound together by a very simple mathematical law of connection and integration—the law of attraction—according to which *every one of them is related to and united with every other.*[20] Thus each one takes its part and plays its role in the building of the *Systema mundi.*

The universal application of the law of attraction restores the physical unity of the Newtonian universe and, at the same time, gives it its intellectual unity. Identical relations hold together identical contents. In other words, it is the same set of laws which governs all the motions in the infinite universe: that of an apple which falls to the ground[21] and that of the planets which move round the sun. Moreover, the very same laws explain not only the identical pattern (discovered by Kepler) of the celestial motions but even their individual differences. Not only the regularities, but also the irregularities (inequalities). All the phenomena which for centuries baffled the sagacity of astronomers and physicists (such, for instance, as tides) appear as a result of the concatenation and combination of the same fundamental laws.

The Newtonian law of attraction—the inverse square law—is not only the only one that explains the facts. It is, besides, the only one that can be uniformly and universally applied to large and small bodies, to apples and to the moon; the only one, therefore, that it was reasonable for God to have adopted as a law of creation.[22]

Yet, in spite of all this, in spite of the rational plausibility and mathematical simplicity of the Newtonian law (the inverse square law is simply the law of extension of spherical surfaces identical with that of the propagation of light) there was in it something that baffled the mind. Bodies attract each other, act upon each other (or, at least, behave as if they did). But how do they manage to perform this action, to overcome the chasm of the void that so radically separates and isolates them from each other? We must confess that nobody, not even Newton, could (or can) explain, or understand, this *how.*

Newton himself, as we well know, never admitted attraction as a physical force. Time and again he said, and repeated, that it was only a "mathematical force," that it was perfectly impossible—not only for matter but even for God—to act at a distance, that is, to exert action where the agent was not present. That the attractive force therefore—and this gives us a singular insight into the limits of the so-called Newtonian empiricism—was not to be considered as one of the essential and fundamental properties of bodies (or matter), one of these properties such as extension, mobility, impenetrability, and mass, which could neither be diminished nor increased.[23] That it was a property to be explained. That he could not do it, and that, as he did not want to give a fanciful explanation when

[20] According to Newton, only these atomic attractions, whatever they may be, are real. Their resultants are by no means real forces but only "mathematical" ones. Thus, it is not the earth that attracts the moon, but all and each particle of the earth attracts all and each particle of the moon. The resultant, global, attraction has no other than mathematical existence.

[21] The famous story according to which Newton's thinking on gravitation had been aroused by the sight of an apple falling to the ground, which has been treated as legend by generations of historians, appears to be perfectly true, as has been convincingly demonstrated by M. J. Pelseneer in "La Pomme de Newton," *Ciel et terre,* 53e année (1937), pp. 190–93.

[22] The inverse square law of attraction is the only one which makes possible a direct comparison between the earth's attraction of an apple, and the earth's attraction of the moon, because it is the only one according to which the earth, or, generally, a spherical body, attracts all external bodies, irrespective of their distance from it, as if all its mass were concentrated in its *centrum.*

[23] A property which can be neither increased nor diminished belongs to the essence of the thing.

lacking a good theory, and as science (mathematical philosophy of nature) could perfectly well proceed without, he preferred to give none (this is the meaning of his celebrated *Hypotheses non fingo*) and leave the question open.[24] Yet, as strange, or as natural, as it may seem, nobody—with the exception only of Colin McLaurin—followed him in that point. The very first generation of his pupils (Cotes, Keill, Pemberton) accepted the force of attraction as a real, physical, and even essential property of matter, and it was their doctrine which swept over Europe and which was so strongly and persistently opposed by Newton's Continental contemporaries.

Newton did not admit action at a distance. Yet, as Voltaire very reasonably pointed out, from the point of view of purely empirical knowledge (which seemed to be the point of view of Newton), the ontological distinction between the attraction and the other properties of bodies could not be justified. We do not, of course, understand attraction. But do we understand the other properties? Not understanding is not a reason to deny a fact. Now attraction is a fact. Thus we have to admit it, just as we are admitting other facts or properties of bodies. Who knows, besides, what unknown properties we may discover as pertaining to them? Who knows with what sort of properties God has endowed matter?

The opposition to Newtonianism—understood as *physics*—was in the beginning deep and strong. But gradually it crumbled away. The system worked and proved its work. And as for attraction, progressively it lost its strangeness. As Mach has very finely expressed it, "the uncommon incomprehensibility became a common incomprehensibility." Once used to it, people—with very few exceptions—did not speculate about it any more. Thus fifty years after the publication, in 1687, of the *Philosophiae naturalis principia mathematica*—a title just as daring and just as consciously challenging as the *Physica coelestis* of Kepler eighty years earlier or the *Évolution Creatrice* of Bergson two hundred years later—the leading physicists and mathematicians of Europe—Clairaut, D'Alembert, Maupertuis, Euler—diligently began the work of perfecting the structure of the Newtonian world, of developing the tools and methods of experimental and mathematical investigation (s'Gravesande and Muschenbroek, Lagrange and Laplace) and of leading it from success to success, until, by the end of the eighteenth century, in the *Mécanique analytique* of Lagrange and the *Mécanique céleste* of Laplace, the Newtonian science seemed to reach its final and definitive perfection. Such a perfection that Laplace could proudly assert that his System of the World left no astronomical problem unsolved.

This as to the mathematicians and scientists. As for the others, for those who could not understand the difficult intricacies of geometrical and infinitesimal reasoning (and who, like Locke, took them for granted) there came forth a series of books—and very good ones—such as Pemberton's *View of Sir Isaak Newton's Philosophy* (1728), Voltaire's *Lettres anglaises* (1733) and *Éléments de philosophie de Newton* (1738), Algarotti's *Newtonianismo per le donne* (1737, 1738), Colin MacLaurin's *Account of Sir I. Newton's Philosophical Discoveries* (1746),[25] Euler's *Lettres à une princesse d'Allemagne* (1770), and, finally, Laplace's

[24] *Hypotheses non fingo* does not mean a condemnation of all hypotheses in science but only of those that cannot be proved or disproved by mathematically treated experiment, specifically, of global qualitative explanations such as were attempted by Descartes. This pejorative meaning of the term coexists in Newton which a nonpejorative one (in the first edition of the *Principia* the Axioms or Laws of motion are called *hypotheses*) and is certainly inherited by him from Isaac Barrow.

[25] All these books, when not written in French, were immediately translated into it and thus made accessible to all the educated people throughout Europe.

Système du monde (1796), which in a clear and accessible language preached to the *honnête homme*, and even to the *honnête femme*, the Newtonian gospel of mathematico-physical and experimental science.

No wonder that (in a curious mingling with Locke's philosophy) Newtonianism became the scientific creed of the eighteenth century[26] and that for his younger contemporaries, but especially for posterity, Newton already appeared as a superhuman being[27] who, once and for all, had solved the riddle of the universe.

Thus it was by no means in a spirit of flattery but in that of deep and honest conviction that Edmund Halley wrote *nec fas est propius mortali attingere divos.*[28] Did not, a hundred years later, Laplace, somewhat regretfully, assign to the *Principia* the pre-eminence above all other productions of the human mind; indeed, as Lagrange somewhat wistfully stated, there being only one universe to be explained, nobody could repeat the act of Newton, the luckiest of mortals.

Small wonder that, at the end of the eighteenth century, the century that witnessed the unfettered progress of Newtonian science, Pope could exclaim in his Epitaph for Newton:

> Nature and nature's laws lay hid in night
> God said: let Newton be, and everything was light.

Pope could not know, indeed, that:

> 'Twas not for long: for devil howling: "Ho, Let Einstein be!" restored the status quo.

But let us now come back to Newton. It has often been said that the unique greatness of Newton's mind and work consists in the combination of a supreme experimental with a supreme mathematical genius. It has often been said, too, that the distinctive feature of the Newtonian science consists precisely in the linking together of mathematics and experiment, i.e., in the mathematical treatment of the phenomena, that is, of the experimental or observational (as in astronomy, where we cannot perform experiments) data. Yet, though doubtless correct, this description does not seem to me to be a complete one; thus there is certainly much more in the mind of Newton than mathematics and experiment; there is, for instance—besides religion and mysticism—a deep intuition for the limits of the purely mechanical interpretation of nature.[29] And as for Newtonian science, built, as I have already mentioned, on the firm basis of corpuscular philosophy, it follows, or, better, develops and brings to its utmost perfection the very particular logical pattern (by no means identical with mathematical treatment in general) of atomic analysis of global events and actions, that is, the pattern of reducing the given data to the sum-total of the atomic, elementary components (into which they are in the first place dissolved).[30]

The overwhelming success of Newtonian physics made it practically inevitable that its particular features became thought of as essential for the building of science—of any kind of science—as such, and that all the new sciences that emerged in the eighteenth century—sciences of man and of society—tried to conform to the Newtonian pattern of empirico-deductive knowledge and to abide by the rules laid down by Newton in his famous *Regulae philosophandi*, so often quoted and so often misunderstood. The

[26] For Voltaire, as well as for Condorcet, Locke and Newton represent the summits of science and philosophy.

[27] It is well known that the Marquis de L'Hopital asked—quite seriously—if Newton ate and slept like other mortals.

[28] "Nearer the gods no mortal may approach" (Edmund Halley, "Isaac Newton, an Ode," trans. Leon J. Richardson in Cajori, *op. cit.*, p. xv).

[29] It seems to me quite certain that Newton arrived at the conclusion that a purely mechanical explanation of attraction was perfectly impossible because, in order to do so, he had to postulate another—less awkward, yet still non-mechanical—power, namely, that of repulsion.

[30] Thus (cf. n. 20) the global effect of a body acting upon another body is the sum-total of atomic actions.

results of this infatuation with Newtonian logic, that is, the results of the uncritical endeavor mechanically to apply Newtonian (or rather pseudo-Newtonian) methods to fields quite different from that of their original application, have been by no means very happy, as we shall presently see. Yet, before turning our attention to these, in a certain sense illegitimate, offshoots of Newtonianism, we have to dwell for a moment upon the more general and more diffuse consequences of the universal adoption of the Newtonian synthesis, of which the most important seems to have been the tremendous reinforcement of the dogmatic belief in the so-called "simplicity" of nature and the reintroducing through science into this very nature of very important and very far-reaching elements of not only *factual,* but even *structural,* irrationality.

In other words, not only did Newton's physics use *de facto* such obscure ideas as power and attraction (ideas suggesting scholasticism and magic, protested the Continentals), not only could it not give a rational deduction of the actual composition of the choir of heaven and furniture of earth, i.e., of the factual number, size, location, and distribution of the celestial and terrestrial bodies, but even its fundamental dynamic law (the inverse square law), though plausible and reasonable, was by no means necessary and, as Newton has carefully shown, could be quite different.[31] Thus the law of attraction itself was nothing more than a mere fact.

And yet the hamonious insertion of all these facts into the rational frame of spatio-mathematical order, the marvelous *compages* of the world, seemed clearly to exclude the subrationality of chance, but rather to imply the supra-rationality of motive; it seemed perfectly clear that it had to be explained not by the necessity of cause but by the freedom of choice. The intricate and subtle machinery of the world seemed obviously to require a maker. Or, to put it in Voltaire's words: the clockwork implies a clockmaker (*l'horloge implique l'horloger*).

Thus the Newtonian science, though as *mathematical philosophy of nature* it expressly renounced the research of causes (both physical and metaphysical), appears in history as based on a dynamic conception of physical causality and as linked together with theistic or deistic metaphysics. This metaphysical system does not, of course, present itself as a constitutive, or integrating part of the Newtonian science; it does not penetrate into its formal structure. Yet it is by no means an accident that not only for Newton himself but also for all the Newtonians—with the exception only of Laplace—this science implied a reasonable belief in God.[32]

Once more the book of nature seemed to reveal God. An engineering God this time who had not only made the world-clock but continuously had to supervise and to tend it in order to mend its mechanism when needed (a rather bad clockmaker, this Newtonian God, objected Leibniz), thus manifesting his active presence and interest in his creation. Alas, the very development of the Newtonian science which gradually disclosed the consummate skill of the Divine Artifex and the infinite perfections of his work left less and less place for divine intervention. The world-clock more and more appeared as needing neither rewinding nor repair. Once put in motion, it ran for ever. The work of creation once executed, the God of Newton —just as the Cartesian God after the first (and last) *chiquenaude* given to matter —could rest. Just like the God of Descartes—so bitterly opposed by the Newtonians—he had nothing more to do in the world.

Yet it was only at the end of the

[31] Cf. Newton, *Mathematical Principles of Natural Philosophy,* Book I, Theorem IV, corr. 3, 4, 5, 6, and 7, in Cajori, *op. cit.,* pp. 45–46.

[32] Cf. John H. Randall, *The Making of the Modern Mind* (rev. ed.; Boston: Houghton, Mifflin Co., 1940).

eighteenth century with Laplace's *Mécanique céleste* that the Newtonian God reached the exalted position of a *Dieu fainéant*, which practically banished him from the world ("I do not need that hypothesis," answered Laplace to Napoleon, who inquired about the place of God in his system), whereas for the first generation of Newtonians, as well as for Newton himself, God had been, quite on the contrary, an eminently active and present being, who not only supplied the dynamic power of the world machine[33] but positively "ran" the universe according to his own, freely established, laws.

It was just this conception of God's presence and action in the world which forms the intellectual basis of eighteenth-century world feeling and explains its particular emotional structure: its optimism, its divinization of nature, etc. Nature and nature's laws were known and felt to be the embodiment of God's will and reason. Could they, therefore, be anything but good? To follow nature, and to accept as highest norm the law of nature, were just the same as to conform one's self to the will, and the law, of God.[34]

Now, if order and harmony so obviously prevailed in the world of nature, why was it that they, as obviously, were lacking in the world of man? The answer seemed clear: disorder and disharmony were man-made, produced by man's stupid and ignorant attempt to tamper with the laws of nature or even to suppress them and to replace them by man-made rules. The remedy seemed clear, too: let us go back to nature, to our own nature and to live and act according to its laws.

But what is human nature? How are we to determine it? Not, of course, by borrowing a definition from Greek or Scholastic philosophers—not even from modern ones, such as Descartes or Hobbes. We have to proceed according to pattern. And to apply the rules which Newton has given us. That is, we have to find out, by observation, experience, and even experiment, the fundamental and permanent faculties, the properties of man's being and character that can be neither increased nor diminished; we have to find out the patterns of action or laws of behavior which relate to each other and link human atoms together. From these laws we have to deduce everything else.

A magnificent program! Alas, its application did not yield the expected result. To define "man" proved to be a much more difficult task than to define "matter," and human nature continued to be determined in a great number of different, and even conflicting, ways. Yet so strong was the belief in "nature," so overwhelming the prestige of the Newtonian (or pseudo-Newtonian) pattern of order arising automatically from interaction of isolated and self-contained atoms, that nobody dared to doubt that order and harmony would, in the same way, be produced by human atoms acting according to their nature, whatever this might be: instinct of play and pleasure (Diderot) or pursuit of selfish gain (A. Smith). Thus return to nature could mean free passion as well as free competition. Needless to say, it was the last interpretation that prevailed.

The enthusiastic imitation (or pseudo-imitation) of the Newtonian (or pseudo-Newtonian) pattern of atomic analysis and reconstruction that up to our times proved to be so successful in physics,[35]

[33] In a world made up of absolutely hard particles there is necessarily a constant loss of energy; the Newtonian God, therefore, not only had to supply the initial amount but constantly had to replace the loss.

[34] The eighteenth-century optimism has had its philosophical source not only in the Newtonian world view but just as well in the rival world conception of Leibniz. More importantly, it was based simply on the feeling of a social, economic, and scientific progress. Life was rather pleasant in the eighteenth century and became increasingly so, at least in the first half of it.

[35] Contemporary physics has been obliged to transcend the atomic pattern of explanation: the whole is no longer identical to the sum of its parts, particles cannot be isolated from their surroundings, etc.

in chemistry, and even in biology led elsewhere to rather bad results. Thus we have had atomic psychology, which explained (or explained away) mind as a mosaic of "sensations" and "ideas" linked together by laws of association (attraction); we have had, too, atomic sociology, which reduced society to a cluster of human atoms, complete and self-contained each in itself and only mutually attracting and repulsing each other.

Newton, of course, is by no means responsible for these, and other, *monstra* engendered by the overextension—or aping—of his method. Nor is he responsible for the more general, and not less disastrous, consequence of the widespread adoption of the atomic pattern of analysis of global events and actions, according to which these latter appeared to be not *real*, but only *mathematical*, results and summings-up of the underlying elementary factors, a type of analysis which led to the nominalistic misconception of the relation between a *totum* and its parts—a misconception which, as a matter of fact, amounted to a complete negation of *tota* (a *totum* reduced to a mere sum of its parts is not a *totum*) and which nineteenth- and twentieth-century thought has had such difficulty in overcoming.[36] No man can ever be made responsible for the misuse of his work or the misinterpretation of his thought. Not even if such a misuse or misinterpretation appears to be—or to have been—historically inevitable.

Yet there is something for which Newton—or, better, not Newton alone but modern science in general—can still be made responsible: it is the splitting of our world in two. I have been saying that modern science broke down the barriers that separated the heavens and the earth and that it united and unified the universe. And that is true. But, as I have said, too, it did this by substituting for our world of quality and sense-perception, the world in which we live, and love, and die, another world: the world of quantity, or reified geometry, a world in which, though there is place for everything, there is no place for man. Thus the world of science—the real world—became estranged and utterly divorced from the world of life, which science has been unable to explain—not even to explain away by calling it "subjective."

True, these two worlds are every day —and even more and more—connected by the *praxis*. Yet, for *theory* they are divided by an abyss.

Two worlds: this means two truths. Or no truth at all.

This is the tragedy of the modern mind which "solved the riddle of the universe" but only to replace it by another riddle: the riddle of itself.[37]

[36] The evolution of the nineteenth-century scientific thought can be represented as an anti-Newtonian development; the fundamental new idea that dominates it is that of the *field*. Pure mechanism broke down with James Clerk Maxwell.

[37] Cf. Alfred North Whitehead, *Science and the Modern World* (New York: Macmillan Co., 1925); E. A. Burtt, *The Metaphysical Foundations of Modern Science* (rev. ed.; New York: Harcourt, Brace & Co., 1932).

NEWMAN ON THE USES OF KNOWLEDGE

A. Dwight Culler

JUST short of a hundred years ago John Henry Newman was called to establish a Catholic university in Ireland, and he prepared for that occasion a series of discourses which now form the first part of the *Idea of a University*. The idea, one might say, has lived on, although the university did not; and this fact is significant because it symbolizes the character of Newman's work. His work was not practical or institutional—indeed, it was hardly even educational in the stricter sense; for, whereas education is primarily concerned with means, with the techniques for achieving what society wants, Newman was largely concerned with the ends which society ought to want. He was engaged in constructing an intellectual and cultural ideal, and thus his work belongs less with the great educational classics, properly so called, than with the classics of idealized portraiture. The ideal ruler of Plato, the ideal orator of Aristotle and Cicero, the medieval saint, the courtier of Castiglione, and the perfect prince and poet of the Renaissance—these are the figures from which Newman's creature of philosophic habit is descended. Like all ideals, they accomplish nothing directly, but they embody the aspirations of an age—they provide an object of desire. To the educator who wants to know what he should *do*, they are of little value; but to the student who wants to know what he should *be*, they are a source of continuing inspiration.

The heart of Newman's cultural ideal lies in his belief in the integrity of all knowledge and the need of the human mind to reflect that integrity. If reality is one and knowledge is of reality, then knowledge is likewise one, and its division into the separate sciences is merely for the convenience of study and does not correspond to any division in reality. Reality is one, and the sciences are merely modes of viewing reality. They abstract portions of reality for present consideration and thus, although complete in their own idea, are always incomplete in relation to their subject; and to the extent that they are incomplete, they are necessarily untrue. The perfection of truth lies only in the entire circle of the sciences, and a university which professes truth as its object will keep that circle unbroken.

So, too, will a mind which professes truth as its object; and hence the man of philosophic habit, although obviously not universal in the scope of his knowledge, will embody at least the spirit of universality. If he pursues but one discipline, he will nevertheless pursue it in the context of them all. He will study not merely his own subject but also that architectonic science which is called the "science of sciences" and which does not teach any particular discipline but rather the use, the importance, and the interrelationships of them all. Thus, if he knows but little, he will at least know that it *is* but little and will know how it stands in respect to the rest. He will not have walked through all the fields of learning, but he will stand upon an eminence whence he can view them all, and this "clear, calm, accurate vision and comprehension of all things, as far as the finite mind can embrace them, each in its place, and with its own characteristics upon it"[1]—this alone is that true enlarge-

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[1] J. H. Newman, *The Idea of a University*, ed. C. F. Harrold (New York: Longmans, Green &

ment of mind which we call "philosophy," or the "philosophic habit."

"And now," says Newman, "the question is asked me, What is the *use* of it?" His reply, which is a classic defense in English of a liberal education, is that "Knowledge is capable of being its own end" and that "what has its *end* in itself has its *use* in itself also."[2] That knowledge is "its own end," that it may properly be pursued "for its own sake," is certainly the most famous and characteristic assertion of the *Idea of a University*, and the purpose of this article is simply to examine the meaning and assess the validity of that assertion.

Those whom Newman imagines as questioning his ideal are, of course, the Utilitarians. As early as 1829, in an excited list of the "enemies" of the church which Newman drew up for his mother, he gave second place to "The Utilitarians, political economists, useful knowledge people—their organs the 'Westminster Review,' the 'London University,' &."[3] There is no need to detail the widespread influence of this school in the first half of the nineteenth century. It included those who were Utilitarians not only in the technical sense understood by Bentham and the Mills but also in the popular sense acknowledged by Macaulay, Lord Brougham, and the *Edinburgh Review*. Its principles, as Newman saw, could be traced back through the rationalism of the eighteenth century to Locke and ultimately to Lord Bacon, who, though himself a profound and essentially religious thinker, had yet given the first impulse to the modern tendency of judging all things by their material fruits.

In Newman's mind this tendency had manifested itself most strikingly in the attack made by the *Edinburgh Review* on the University of Oxford in 1808–11, for it is this controversy which underlies his whole discussion of useful versus liberal education. The controversy began with three articles which appeared in the *Edinburgh Review* in 1808–9. In the first —a notice by John Playfair, professor of natural philosophy at Edinburgh, of Laplace's *Traité de méchanique céleste* —there was a single sentence at the very end of the review which blamed Oxford for the low condition of mathematics in England. The second article, written by Richard Payne Knight,[4] was an attack on a splendid new edition of Strabo which had been printed at the University press. And, finally, a review of R. L. Edgeworth's *Essays on Professional Education* was used by Sydney Smith as an occasion for attacking the Oxford classical education. As the insults mounted in number and force, "the whole university," we are told, "was in hot water" over them.[5] Troubled alumni wrote up from the country to inquire what was wrong, and their delighted sons replied in verse:

Since the cold cutting gibes of that Northern Review
Have tormented and teazed Uncle Toby and you,
I'm exceedingly happy in sending you down
A defence which is making much noise in the town,
Of all our old learning and fame immemorial,
Which is said to be writ by a Fellow of Oriel.[6]

The "defence" was Edward Copleston's *Reply to the Calumnies of the Edinburgh Review* (1810), a pamphlet of some two hundred pages, which he later

Co., 1947), p. 123. Hereafter, references simply to "Newman" are to this volume.

[2] *Ibid.*, pp. 91, 143.

[3] J. H. Newman, *Letters and Correspondence*, ed. Anne Mozley (2 vols.; London: Longmans, Green & Co., 1890), I, 179.

[4] Not Francis, Lord Jeffrey, as Newman supposed (Newman, p. 139). Knight was a connoisseur and numismatist, the author of *Principles of Taste* (1808). The article is identified as his in Griggs, Irwin, *et al.*, "Early *Edinburgh* Reviewers: A New List," *Modern Philology*, XLIII (1946), 207–8.

[5] *Blackwood's Magazine*, III (June, 1818), 280.

[6] *Ibid.*, p. 281, quoted in Maisie Ward, *Young Mr. Newman* (New York: Sheed & Ward, 1948), pp. 69–70.

supplemented by *A Second Reply* and *A Third*. It was answered by Playfair, Knight, and Smith in a joint review and was supported by two articles in the *Quarterly* by John Davison, another Fellow of Oriel. In addition to these main contenders, there was a flood of observations, remarks, letters to the editor, and poetical accounts, which did not subside until the very end of the year 1811.

All in all, it was a very miniature Battle of the Books, but it assumed such importance at Oxford, even in Newman's day, that, when he came to write the *Idea of a University* some forty years after the event, he felt he could still use it to dramatize this clash of opinion and even to provide himself with arguments. And readers of the seventh discourse will remember that he quotes briefly from the *Edinburgh Review* and very extensively from the writings of Copleston and Davison.

Most of the quarrel concerned mere matters of fact. When it did rise to a statement of principle, it was a quarrel over the relative merits of the classics, on the one hand, and the natural and social sciences, on the other, as a means of education. The position of the reviewers was that the latter were more useful, and by this they meant not so much useful in the individual's profession as useful to society at large. The former position, however, had been taken by their master, Locke, and so the Oxonians felt it necessary to reply to both; and Newman's reply follows theirs very closely. It is, of course, true that the studies which Newman is defending are not classical but general—or, as he says, "liberal." Nevertheless, they do not differ from classical studies in point of utility, for they are actually defined as those studies which are *not useful* in the direct service of man. Thus it comes as a kind of paradox when he would make these studies the very basis of a university education, and he justifies this by laying it down as a principle that, although "the useful is not always good, the good is always useful."[7] This principle, as Newman himself recognizes, reflects the discussion in ancient ethics over the *honestum* and the *utile*, the right and the expedient; and it follows the solution given by Cicero and others that whatever is right will prove in the long run to be expedient also. In other words, liberal knowledge, although distinct in its nature from useful, will be found to have an ultimate utility not only in one's profession but also in the larger life which we are all called upon to lead simply as members of human society.

First, its professional utility. There are two common arguments for the value of a liberal education in a person's work. The first is that, since there are no divisions in reality corresponding to our divisions of labor, the specialist really needs to know more than his specialty and, indeed, not knowing more, will not know even that. In its general form this argument is valid, and it is fully explored by Newman in his discussion of the integrity of knowledge in the first half of the *Idea of a University*. In discussing the utility of this knowledge, however, he depends chiefly upon the second argument, which is that a liberal education trains the good mind and the good mind is useful in one's profession.

This argument is both more common and more specious. It was apparently a prime article of faith in the Oriel Common Room in the 1820's, where it usually took the form that a liberal education, without directly qualifying a man for any profession, mysteriously fitted him for all. There was a sense in which he could do nothing, but in a sense there was nothing he could not do, and the two senses were left rigorously undefined. Archbishop Whately, while a Fellow of Oriel, had persuaded himself that by his own liberal education he was "fitted . . . for entering upon any [branch of study]," but a vein of healthy realism impelled him to add, "[I] have not done

[7] Newman, p. 145.

so and probably shall not. . . ."[8] Newman acknowledged that his ideal philosopher "will not indeed at once be a lawyer, or a pleader, or an orator, or a statesman, or a physician, or a good landlord, or a man of business, or a soldier, or an engineer, or a chemist, or a geologist, or an antiquarian, but," he contended, "he will be placed in that state of intellect in which he can take up any one of the sciences or callings I have referred to . . . with an ease, a grace, a versatility, and a success, to which another is a stranger."[9]

The versatility of Newman's philosopher depends on what educators call "transfer of training," that is, the possibility that training acquired in one subject, such as Latin grammar, will be of use in learning another subject, such as chemistry. Educational psychologists now believe that this transfer does occur under somewhat broader conditions than the early investigations of Thorndike seemed to show; and, indeed, in all the generalized disciplines, and especially logic, the transfer of training from one material to another is the very reason for their generality. Thus the objection to Newman's view is not the psychological one that transfer of training does not occur but the merely sensible one that if you want to learn one subject, you don't begin by learning something else instead. A man who wants to walk from New York to Boston will not first walk to St. Louis simply to harden his muscles. He will harden them on the way to Boston. Newman, however, has separated the exercise of walking from the path traversed, that is, the cultivation of the intellect from the acquisition of information, and he has assigned the first process exclusively to the liberal disciplines. But if it should be the complexity and not the inutility of a discipline which fits it for cultivating the intellect and if useful studies have this complexity, then there would be no further reason for studying liberal knowledge.

The reason is perhaps offered in the second kind of utility claimed for liberal studies, namely, their utility to society at large. Here the distinction between useful and liberal knowledge is resolved into a distinction between specialized and general knowledge. Useful knowledge is necessarily specialized because the useful arts are merely the tangible issue of particular sciences; but the science of sciences, the knowledge which integrates other knowledge, has no corresponding art, and hence liberal knowledge is necessarily general.[10] Or, to put it in the language of Adam Smith, useful knowledge is specialized because only by the division of labor can one achieve the excellence which makes that labor useful. There are, of course, exceptions. Any work of co-ordination is both useful and general, but in a highly organized society it is, for the most part, true that useful knowledge will be specialized and that knowledge which is general will be too elementary to be useful. Copleston and Davison acceped this view as correct, but they observed that the specialization which improves the individual as a worker impoverishes him as a human being. Adam Smith had declared that the evil contained its own remedy, for by specialization the world's work would be done sooner and the new leisure might then be used in acquiring the general knowledge which had apparently been forfeited, but Copleston thought this a dubious remedy for a certain ill.[11] He did agree, however, that there are emergencies in which the good to be achieved by specialization is worth the sacrifice that it requires. Military training destroys the soldier in order to save the republic, and the scientist who narrows his life to

[8] Richard Whately, *Miscellaneous Remains from the Commonplace Book*, ed. E. J. Whately (London, 1864), pp. 55–56.

[9] Newman, pp. 146–47.

[10] *Ibid.*, p. 91.

[11] Edward Copleston, *A Reply to the Calumnies of the Edinburgh Review* (Oxford, 1810), p. 108.

discover a cure for poliomyelitis is justified by the lives of the children he saves. But the problem is not merely to balance the individual's loss against society's gain, for society reflects both the loss and the gain. What it gains in the skilled worker it loses in the judicious citizen, and this is a necessary result of the two principles on which society is organized. Productively, society is a whole because it integrates many parts, but culturally and politically it is a whole because it is an aggregate of wholes. As workers we are responsible for only a tiny segment of life, but as citizens and human beings our duties are as various as life itself. The wide sphere of these duties must be anticipated by a wide sphere of knowledge, and such knowledge is necessarily liberal. Thus, says Newman, "if a practical end must be assigned to a University course, I say it is that of training good members of society."[12]

Such is the conclusion of Newman's seventh discourse, and one has to admit that the argument is widely received and contains much truth. Nevertheless, it seems to me profoundly unsatisfactory, for it is really a betrayal of Newman's primary position. In the fifth discourse he had asserted that "knowledge is capable of being its own end," and now he adds that "what has its *end* in itself has its *use* in itself also." At first sight these phrases appear like two stages in the same argument, but actually their tenor is quite distinct. The first declares that there is a knowledge worthy of study which is not useful, whereas the second declares that, since this knowledge forms the good mind and the good mind is useful, therefore the knowledge itself is ultimately useful. Thus the first challenges utility as a criterion for evaluating knowledge, whereas the second accepts that criterion and merely claims that liberal knowledge is useful too. Of course it is; but the more interesting question is not how knowledge which turns out to be useful can be justified but how knowledge can be justified prior to, and quite apart from, any utility that it may subsequently possess. Exactly what does it mean, in other words, to say that "knowledge is capable of being its own end"?

It is well to ask this question because the phrase is used today in a sense utterly contrary to that which Newman gave it. Today it expresses the view that any fact is worth knowing simply because it is a fact and without regard to its usefulness in human life. Indeed, both the president of Harvard and the vice-chancellor of Oxford, though they are obviously acquainted with Newman's book, have recently spoken of the "danger" that "knowledge may become an end in itself."[13] The phrase, of course, is inherently ambiguous, and, in reading Newman, we must remember that "Knowledge" always means ordered knowledge and that it usually carries a subjective, rather than an objective, sense. It is not the thing known but the state or condition of knowing. Thus knowledge for its own sake is not for the sake of "it known" but of "us knowing"; and it is the well-informed mind and not the information itself which is capable of being its own end. A less ambiguous phrase would be "knowing its own end" or knowledge "for the sake of the knowing mind."

This becomes clear enough when we turn to Aristotle, who is the dominant influence on Newman at this point. Aristotle had found that a useful way of looking at things was in the light of their end, and thus it had become a central problem in ancient ethics to discover the proper end of man. But the end of anything was, in the first instance, simply to *be* that kind of thing, and thus the end of man was simply the perfection of his nature. Man's nature, in the traditional view, consisted not in mere life, which he shared

[12] Newman, p. 156.

[13] Sir Richard Livingstone, *Some Thoughts on University Education* (London: Cambridge University Press, 1948), p. 18; James B. Conant, *Education in a Divided World* (Cambridge: Harvard University Press, 1948).

with plants, or in sensation, which he shared with the animals, but in that which was his distinctively human faculty, the rational soul. The full development and perfection of the rational soul, then, was the proper end of man, and Aristotle often called this simply "knowledge." "All men by nature desire to know," he said in the first sentence of the *Metaphysics,* and in the *Politics* he added: "and the nature of a thing is its end. For what each thing is when fully developed, we call its nature. . . ."[14] Thus, if it is man's nature to know and his end is the perfection of his nature, then knowledge is an end which may be pursued simply for its own sake.

It is therefore the rational character of knowledge, together with the rational nature of man, which makes knowledge capable of being an end in itself. Both Aristotle and Newman reassert this view explicitly. In the *Metaphysics* Aristotle says:

> Understanding and knowledge pursued for their own sake are found most in the knowledge of that which is most knowable (for he who chooses to know for the sake of knowing will choose most readily that which is most truly knowledge, and such is the knowledge of that which is most knowable). . . .[15]

And Newman, in his most deliberate and exact statement of the matter, declares:

> Reason is the principle of that intrinsic fecundity of Knowledge, which, to those who possess it, is its especial value, and which dispenses with the necessity of their looking abroad for any end to rest upon external to itself. . . . The principle of real dignity in Knowledge, its worth, its desireableness, considered irrespectively of its results, is this germ within it of a scientific or a philosophical process. This is how it comes to be an end in itself; this is why it admits of being called Liberal.[16]

[14] Aristotle *Pol.* 1252b (trans. W. D. Ross).

[15] *Met.* 982a–b.

[16] Newman, pp. 99, 100.

We must not ask Newman to tell us precisely what studies are sufficiently informed with reason that they may be considered an end in themselves. They are such *in the degree* that they are so informed; and, if we wish a further account, we must go to Aristotle, whose scale of the degrees of knowledge forms the background of Newman's thought in this matter. Aristotle distinguished five stages of knowledge—sensation, memory, experience, art, and wisdom—which show a gradually increasing power of generality.[17] Sense-perception we do perhaps delight in for its own sake, but, since it is a faculty proper to brutes, to rest in sensation would be to remain a brute forever. To Newman it seemed "improper to call that passive sensation, or perception of things, which brutes seem to possess, by the name of Knowledge."[18] The next stage above this, which we likewise share with some animals, is memory, the ability to store sensations, but again "a great memory . . . does not make a philosopher, any more than a dictionary can be called a grammar."[19] From memory arises experience, the first distinctly human form of knowledge, in which the coalescence of several memories suggests a kind of rule of thumb which we may use successfully without knowing why it works. The sailors whom Newman met on board the "Hermes" in 1832 and who reappear in the discourses twenty years later had had wide experience, but (complained Newman) they had made "very few inductions, and are not in the habit of investigating causes—the very reverse of philosophers."[20] Art, the fourth stage, does investigate causes in a degree, for it is the knowledge of practical rules based on general principles. For example, to observe that a particular remedy helped both Callias and Socrates under partic-

[17] *Met.* 980a–983a.

[18] Newman, p. 100.

[19] *Ibid.,* p. 119.

[20] Newman, *Letters and Correspondence,* I, 252.

ular conditions is the fruit of experience; but to know that the remedy will help all persons of a certain class in an illness of a certain type—this is art, and is the first stage which Aristotle will call "truly knowledge." But elsewhere[21] he speaks of some arts which are so purely empirical and so little involve the reason that Newman, in referring to them, will not have them a part of liberal education.[22] And, finally, the last and highest stage of knowledge is wisdom, which deals with first causes and the principles of things. Aristotle points out that wisdom rises above all other forms of knowledge in being more universal, more difficult, more precise, more instructive, and more authoritative than they, but, above all else, it is distinguished by being unproductive. "We do not seek it for the sake of any other advantage; but as the man is free, we say, who exists for his own sake and not for another's, so we pursue this as the only free science, for it alone exists for its own sake."[23]

Newman's conception of the science of sciences, that architectonic discipline which integrates all lesser disciplines, obviously owes much to Aristotle's conception of wisdom. They are clearly not identical—what the one does in the order of knowledge is done by the other in the order of nature—but they have the same two qualities of generality and unproductiveness, and Newman even calls his discipline by the very terms which Aristotle uses for his—sometimes "Science," sometimes "Philosophy," sometimes *philosophia prima*. Despite their resemblance, however, we cannot say that the study which Newman is defending is merely a metaphysic of the sciences. Strictly and formally, that may be true, but ever in the forefront of his mind is the controversy between his university and the *Edinburgh Review*, in which the issue was not that of general versus specialized knowledge but the humanities versus the sciences. And, certainly, Newman's ideal has—and, indeed, has to have—the added richness which this ambiguous background gives it, for it will not serve its purpose otherwise. When Newman said that it was the rational character of knowledge, together with the rational nature of man, that made knowledge capable of being an end in itself, he was using "reason" not as any particular faculty but as the entire breadth of man's mental life, for only by the perfection of his entire nature can the end of man be achieved. But reason merely in the sense of the power of abstraction does not have this breadth. It would exclude poetry, which revels in the particularity of fact, and history, which records it; and yet we know that Newman's liberal education depended heavily on history and poetry. Thus it is well to accept the general lesson of Aristotle's teleology—that knowledge which develops man's nature may be pursued for its own sake—without allowing it to narrow our conception of what this liberal knowledge is.

When we inquire what is meant by the epithet "liberal," we are first led, says Newman, to oppose it to "servile," as belonging to the mind and not the body. But then we recall that there are mental exercises, such as medicine in ancient times and commerce now, which afford scope for the highest powers of mind but which are not technically called "liberal," and, on the other hand, that there are bodily exercises, such as the palaestra and the Olympic games, which *are* so called.

> Why this distinction? because that alone is liberal knowledge, which stands on its own pretensions, which is independent of sequel, expects no complement, refuses to be informed (as it is called) by any end, or absorbed into any art, in order duly to present itself to our contemplation. The most ordinary pursuits have this specific character, if they are self-sufficient and com-

[21] *Eth.* 1140a; *Pol.* 1258b; cf. Plato *Gorg.* 448C, 462BC.

[22] Newman, p. 94.

[23] *Met.* 982b.

plete; the highest lose it, when they minister to something beyond them.[24]

Aristotle had made this same distinction in regard to possessions. "Of possessions," he says in a passage quoted by Newman, "those rather are useful, which bear fruit; those liberal, which tend to enjoyment. By fruitful, I mean, which yield revenue; by enjoyable, where nothing accrues of consequence beyond the using."[25] A shuttle, for example, is useful, since something else is made by it, whereas a garment has its use in itself and so may be called "liberal."[26] In the opening section of the *Ethics* Aristotle extended this distinction from possessions to activities—indeed, it applies to possessions largely as representative of activities—

> Every art and every inquiry, and similarly every action and pursuit, is thought to aim at some good. . . . But a certain difference is found among ends; some are activities, others are products apart from the activities that produce them. Where there are ends apart from the actions, it is the nature of the products to be better than the activities.[27]

The end of weaving, for example, is the garment produced, and the garment is better than the activity of weaving; but from wearing a garment nothing issues except the benefit and enjoyment of the activity itself. One might say that warmth and adornment are the "products" which issue from wearing a garment; but the point is that warmth and adornment, unlike the garment, are not separable from the activity which produced them. Indeed, the distinction becomes most fruitful and most precise if we abandon the conception of a product, which is suited only to an art or industry, and describe liberal activities as those whose value is substantial *with* the activity, and useful as those whose value is consequent *upon* and external *to* the activity.

[24] Newman, pp. 95–96.

[25] Aristotle *Rhet.* i. 5; Newman, p. 97.

[26] Aristotle *Pol.* 1254a.

[27] *Eth.* 1094a.

Newman does not attempt to say which kinds of knowledge are liberal and which are useful, and, indeed, a complete economy of knowledge would be so elaborate that we may restrict ourselves to three statements. First, it is clear that many kinds of knowledge have both substantial and external value. To Kepler, for example, the value of astronomy lay in the utter loveliness of the truths which it contemplates, and this value is inseparable from the contemplation; but astronomy is also valuable to people who never heard of these truths, for it insures the safety of navigation and aids in the production of crops. Second, it seems likely that no form of knowledge is utterly without substantial value, although the value may be so slight that we can neglect it in practice. The chief value of the knowledge involved in plumbing, for instance, is not to him who knows but to the person convenienced by it; yet one could hardly say that there is no satisfaction at all in knowing about pipes and wrenches. It is merely that the satisfaction is so rudimentary that a human being does not willingly rest in it, and hence, although "liberal" to a degree, it could hardly be made the basis of a liberal education. And, third, it does seem likely that some forms of knowledge are completely without external value. What is the value to other people of my knowing a poem? There must be some, one feels, because they pay me to know it, and wages are a sign of value received. But the value received *is* the knowledge. I teach the poem or I write books about it, which is another form of teaching, and there seems to be nothing else that I can do with it. The value which a scholar finds in a poem may be such as will transform his entire life, but he cannot distil this value into a serum and inoculate his students while they sleep. For good or ill, the value which he finds is inseparable from the process by which he found it. He may explain it to others, but he will convey only an explanation and not the value itself. He may write it up in books

or monographs, but, in so doing, he will only produce another knowledge with a slightly different value—and again with *no* value except as it, too, is known. He has no way of conveying the value except by conveying the knowledge in which it inheres, for the value of knowing a poem is inseparable from the knowledge itself.

Newman would not restrict his university to this third type of knowledge, but he would ask that whatever knowledge it made the subject of its contemplation it should contemplate only under this aspect. It would prize astronomy because, in the loveliness and precision of its truths, it has the power of recreating and refining the mind. That it also has the power to guide the sailor and assist the farmer is a reason for gratefulness, but it is not this power which a university considers. The power of knowledge to relieve pain, to insure safety, to construct open and wholesome cities, to order society, to accelerate movement, and to release great energy—all these powers are wonders with which we could not dispense but with which, as a university, we are not concerned. We are concerned only with the power which knowledge has to perfect the human intellect. To open it, refine it, correct it, to discipline its powers and give it mastery over itself —this is the end which is served by liberal knowledge, and, since this is also the end of man, we may properly say that such knowledge is "its own end" or may be pursued "for its own sake."

Such is Newman's thought on the proper uses of knowledge, and one feels that this portion of his argument is rigorous and winning and genuinely fruitful. Nevertheless, there are objections that arise, and the first is that we have placed the end of knowledge in something which can never stand as a motive for knowledge. Psychologically, it seems quite impossible to realize a spiritual end which we consciously pursue. Franklin, for example, found that when he strove to be humble his very success had the effect of making him proud, and John Stuart Mill observed that happiness could not be pursued directly. Happiness is the end of life; but, if you make it your object in life, then it mysteriously eludes you. It depends on the satisfaction of desires, and thus there must be objects which really are desired if the happiness of achieving them is to be a real happiness. So, too, with knowledge. It may well be that the end of knowledge is the perfection of the intellect, but will an intellect be perfected by pursuing knowledge in this spirit? One would suppose that it must forget about its own perfection and propose truth as its sole object. Then, if it pursues this object in honesty and sincerity and self-forgetfulness, the perfection will come as a matter of course, and it will not come otherwise. It is true that we must, in the remote regions of our consciousness, remain aware that knowledge is made for man and not man for knowledge; for in the pedant we see one who has forgotten this, who has become so intent upon the object of the game that he has forgotten the reason for playing it, but this awareness must stay remote and is merely a safeguard. The object present before us must always be the truth—the means of our perfection and not the perfection itself. Santayana has said that the only value of possessing great works of literature lies in what they can help us to become, and this is true; but, if we go to literature in that spirit, we will simply reduce it to an approximation of our own mind and will not become anything. We must go to literature to discover the truth about what it is, and only by submitting ourselves to the discipline of that discovery shall we emerge with the perfection which is our end.

The second objection is related to this but is much more fundamental and disturbing, for it arises not out of the facts of consciousness but out of the character of knowledge itself. If we pursue liberal knowledge as a kind of mental gymnastic, a mere exercise of the mind, are we not in danger of sacrificing the power which

knowledge has of placing us in communion with reality? Logic will perfect our faculties as well as history will, and alchemy as well as chemistry; what need, then, if this is their only function, for supplementing formal knowledge by real or even preferring true knowledge to false? To this query Newman would most certainly have replied that, since man has the power to know reality, his nature does not achieve its perfection except in the exercise of that power. The function of a knife is not to *be* sharp but to *cut,* and the function of the mind is not merely to form syllogisms but also to apprehend true premises on which to base them. But, although this answers one problem, it merely brings us back to that at the opposite pole. Knives may be dulled and even broken in cutting, and the example of the pedant again reminds us that our nature may be sacrificed to a knowledge of reality as well as perfected by it. How can we be sure—and this seems to be the major problem arising out of Newman's argument—that the knowledge which can place us in communion with reality is also the knowledge which will best refine and discipline our mind? Or, to put it in another way, how can we be sure that reality has such a character that knowledge of it will constitute the perfection of the mind?

To Aristotle this presented no problem, for all ancient philosophy found the very possibility of knowledge to lie in an identity between the knowing mind and the reality known.[28] It is because man is a microcosm, a tiny counterpart of the great world, that his knowledge of the world is possible. "For it is with earth," says Empedocles, "that we see Earth, and Water with water; by air we see bright Air, by fire destroying Fire. By love do we see Love, and Hate by grievous hate."[29] Thus, if reality is to be known by a rational mind, it must itself have a rational character, and knowledge of such a reality would clearly be the perfection of the mind. Such is the happy nature of the material to be cut that the knife is whetted, rather than dulled, by the act of cutting.

But for Newman this was no longer true. With modern philosophy there had occurred a disjunction between the mind and its object which had made knowledge not into the expression of an identity but rather of a tension, an antagonism, almost a conflict. Newman did not question the possibility of knowledge—indeed, he assumed that the senses afford a true window onto the world—but he did find that the knowledge which is most faithful to the world is that which is most alien to the mind. The mind requires unity, whereas the world requires multiplicity, and it is knowledge that has the task of mediating between the two. Knowledge, then, may be likened to a pyramid, based broadly in sense-perception but rising into the unity of understanding; and the difference between the apex and the base is a symbol which does not exaggerate the unlikeness between the mind and its object. They are as active to passive or as form to matter. The mind invades the anarchy of sense-perception like the Creator putting forth his virtue over chaos. It energizes what is inert, purges off what is accidental and arbitrary, and draws the multiplicity of fact up into the unity of a significant order. It may do this either by the way of discursive reason or by that of intuition; but, whichever way it chooses, the essence of its task is to take an external reality which is unsignificant and out of it to create an inner reality of meaning. It is meaning, really, that characterizes liberal knowledge. Newman may have chosen to define it in purely negative terms, simply as knowledge which is *not* useful, but the thing that keeps it from being merely "useless" is that it has meaning. Meaning is the pragmatic test which knowledge must pass in order to survive in the world of the mind, just as utility

[28] Cf. Ernst Cassirer, *An Essay on Man* (New Haven: Yale University Press, 1944), p. 112.

[29] *Ibid.*

is the test it must pass in order to survive in the world of reality; and Newman feels that what can best survive in the one world is least fitted to survive in the other. It is not, as Oscar Wilde would say, that an object is meaningful *because* it is gratuitous, but, nevertheless, the gratuitous, the ineffectual, the useless, *are* the natural bearers of meaning. They are what objects become when they are used symbolically, when they *stand for* something instead of *serving as* something. Basically, Newman feels, we can do two things with reality. We can either manipulate it, we can utilize it, or we can represent it symbolically and allow it simply to mean. The two processes are never quite distinct in any of our activities, for we manipulate reality into symbols and we utilize symbolic knowledge in the further manipulation of reality. But, nevertheless, there are these two fundamental ways of knowing—or perhaps we should say "ways of doing and being which lie on the extreme verges of knowing." They are the two issues into which the antagonism of knowledge is ever tending—tending but never quite breaking. For the mind *is* in contact with reality, its meanings are built out of reality, but it is in contact only as the one end of a spectrum is in contact with the other—by means, that is, of transforming the other into its own tints and hues.

The solution of Newman's dilemma is obvious. He needs a knowledge which will take us outside ourselves and yet be the fulfilment of ourselves, and such a knowledge is found, of course, only in the knowledge of God. There alone is an objective reality the knowledge of which is the perfection of our nature, and thus the classical phrase, "the end of man is to know," must be completed in the modern Christian world, "the end of man is to know—God." Newman, as we are well aware, did solve his problem, did complete his phrase, in this way. In his early days at Oxford, when he was first formulating his idea of a university, he found himself in danger, he says, of resting in a mere intellectualism, and his recovery from this danger was a part of that deep current of feeling which carried him into the Tractarian movement and finally into the Catholic church. From that point he could look back upon Oxford not as something wrong but merely as something incomplete; and so in the final discourses of the *Idea of a University* he looks back upon the ideal which he has just created and sees that it, too, is incomplete. It is an admirable discipline, but a discipline without an object, and the object is as necessary for the full development of man's nature as it is for lifting him above it. It is interesting, then, especially to those who admire the humanistic element in Newman's ideal but cannot follow him into the fulness of his religious position, that that position, although doubtless having its own religious reasons and its own religious importance, was yet necessary to him simply as the answer to an intellectual problem.

THE FUNCTION OF THE CLASSROOM IN A DEMOCRATIC SOCIETY

Ray Montgomery

A PRELIMINARY to any delineation of techniques possible in the circumscribed situations of American classroom teaching should be a setting-forth of the principles underlying the teacher's approach to his task. The limiting conditions of physical possibilities, the cloak of custom under which the teacher must operate, and the ever present need of sacrificing one objective as it applies to some students in order to win another objective in the instance of other students, confuse the practice of teaching beyond any ordering which can be applied to all classroom situations. An understanding of and a faith in basic principles is the only stabilizing element in the teaching task. Apathy toward principles, the daily substitution of expediency for positive direction, can lead only toward a chaos of values for both the instructor and the students.

In selecting principles, the problem of priority of situation to idea or its reverse need not hold great importance. Principles are not independent of circumstance, but they are superior to circumstance. They have a relationship to the conditions under which they must be applied much like the relationship of father to children: they command, they direct, they explain, they harmonize, they *teach*. No proper parent acts without consideration of the nature of his children, their individual peculiarities, their variant development, their influence on one another and on the parent and the family group. Even so, principle adapts its manifestations in action to the novelties of the situation as well as to its recognizable sameness to the situations of the past in which principle has acted.

The first question of selection would seem to be that posed by Plato, Aristotle, and every philosopher of education after them. What is the nature of the society which the education is intended to create, maintain, or strengthen? The purpose of a journey determines the road that one shall take, as well as the equipment that one must carry. For all concepts of static societies, the difficulty here is much less than for the chameleon idea which is democracy. As Aristotle observed, democracy is the most unstable of all forms of social organization. We might add that it is also the most misunderstood or, better, un-understood. Simply to say that we wish to teach in the interests of democracy is to say nothing communicable. Were we speaking to Aristotle, we would be understood to mean for anarchy, for chaos; were we speaking to the National Association of Manufacturers, we would be thought to mean for laissez faire capitalism; and were we addressing the Communist party, our hearers would applaud our support of Soviet economic measures.

Any teacher who respects his profession as a master-witness of society, therefore, must clarify his own concepts of the social patterns which he knows by the generalized term "democracy." Unless, of course, he wishes to seek consciously some other way of life, in which case he has the alternatives of establishing his own school or of subverting the established system, taking his chances of some kind of retaliation. Both these extremes are practiced in our time, with varying success. Restricting our view to the teacher who desires to promote the

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essentials of the oft praised, seldom analyzed "American way of life," we find that the wish to teach in a manner compatible with the system in no way carries with it an understanding of what the American way is, what methods can best be employed in promoting its welfare, or what effect situations have on the application of methods. These concerns must be attended to before any teacher has the right to don the mantle of society's scholastic master-witness.

By nature, basic principles must be assumptions. The concept of democracy which underlies all the principles and practices mentioned later in this paper has three general aspects: the priority of the dignity of man over all other social concerns; the attitude of mind that welcomes change as the natural order of the social, as well as the physical, universe; and the political policy of establishing limits to every exercise of power. It will be seen that this concept restricts democracy to a liberal interpretation of the means proper to social action but that it enlarges its scope beyond the mere political denotation, including expression in economics and other phases of social experience.

There is something revolting to the liberal mind in the limitation of democracy to the narrow field in which it has been chained by separating its political expression proper from the wider areas of social experience. Only a sterile scholastic or a dull-conscienced individualist could be so blind to the human values inherent in democratic principle and practice. To substitute a mere form of political organization for the majestic view of man as a social animal, seeking his welfare and improvement in all the myriad activities possible to his personality, is to degrade the human being below the level of ants and cockroaches. To make men slaves to mechanical efficiency in creating power for the subordination of a part of mankind to another part is subhuman. To bind men to institutions and dogmas is the way of those who excuse present evil with fanciful promises of heavenly goods to come, the reality of which is unverifiable by any method known to rational man. That way, too, degrades the son of man to a position beneath the rationality level of the least-developed of earth's creatures.

This concept cannot be overstressed for those who are to assume the formidable task of synthesis and compromise which all teaching entails. We have little respect for a person who would presume to perform a brain operation without the least understanding of the brain's structure. But every year our educational institutions pour forth into teaching a host of those who have only a hazy view of the nature of democracy and practically no experience with the structure of our society.

Fortunately, in recent years, some efforts have been made to combine teaching with living, and a few local school administrations are more and more demanding that instructors know more than the textbooks which their pupils use. Wherever the shortage of teachers does not prohibit its consideration, the ideal that the instructor should have suffered knowledge, as well as memorized its clichés, is beginning to raise its head. The shortness of a single lifetime makes it impossible for all knowledge to come through the endurance of direct experience, but a teacher may acquire his "suffered" knowledge by proxy, as it were. He must recognize the undernourished bodies behind unemployment statistics and the underdeveloped personalities which lie cramped between the verbalizations of psychological methods. To accomplish this necessary soul-building on the dehydrated food offered in our cafeteria system of modern education is not an easy task, but it is possible.

The first step is the acceptance of humanity as the important thing in the universe. All else is important or trivial as it relates to us, you and me. If knowledge does not promote our welfare, it is valueless. If a technique oppresses us, it is

useless, no matter how great its "economic utility" may be. If a "discovery" endangers our happiness, it is untrue. The only test of truth is its human possibilities, its ability to promote human welfare and happiness and growth. This is very like the test proposed by the pragmatists, except that the emphasis is shifted from the immediate results to the ultimates and absolutes beyond the appearances of any hour. If a thing works, then it is true; but the working must not be judged by immediate and circumscribed consequences. A gun fired into the forehead of a Jap or German—or an American—usually works the death of the victim, but that does not make the gun a true instrument of man. If that is the meaning of truth, life indeed is hopeless. "The frequency of examples cannot justify that which conscience reprobates," wrote the philosopher Sismondi. The meaning of truth must always be understood in the light of one adjective, *human.*

Failure to fix our gaze on this limitation of the value of knowledge has led to a world in which technology outstrips social and moral development. In our anxiety to adopt practices which produced immediate results of measurable material value, we have forgotten our ultimate concerns, even that of self-preservation. The promise of atomic annihilation has not roused us from our bedazzlement with material production.

In the school world the tragedy is even more distressing. The concept of progressive education has been so bastardized in practice that no one today can say just what education is meant to accomplish, with any hope of general agreement with his thought. Misapplication of John Dewey's idea that every means is an immediate end led to a forgetting that this fact of practice does not excuse us as rational beings from seeing beyond the immediate to the distant. We left the use of Dewey's wisdom concerning relativities in a society dedicated to change in the hands of incompetents who neither grasped his philosophy nor were skilled in the application of the tools he suggested. So greedy were we for the "freedoms" of progressive education that we overlooked the difficulty of applying its disciplines. The result is near-chaos. Too often in our world we have let our great visions be put to the test in the hands of small people—small spiritually and intellectually. We have found, to our dismay, that the multiplication of frying pans doesn't give us a chef and that our choicest eggs remain uncooked or have been splashed all over the kitchen.

If this situation is to be improved, teachers must come to their task with a faith in their ability as leaders. To believe in themselves as leaders, teachers must believe that the changes which they cannot avoid seeing all about them somehow can be made to serve the ends of democratic life. Even more, they must accept this "buzzing, blooming" confusion as an opportunity to advance the goals of human development. Unless they welcome change and are receptive to novelty, they cannot understand the nature of democracy or develop its practices. Worthless indeed to the furtherance of democracy are the teaching stooges of status quo, whether their "ideal" static state be present, past, or future. They are blind to the realities of growth and senescence, fearful of the social awareness which is prerequisite to intelligent direction of change, and weak beyond helplessness as models for the youth of democracy. Belief in the possibility of progress, of human improvement, of social advance, is necessary in every educational experience: it is the essence of education to move forward physically, individually, and socially. Any other concept makes education a blind alley of despair.

One thing more is needed, though sometimes it seems to follow directly from acceptance of the fact and desirability of constant change. That is humility.

The finest efforts of the teacher will

fail if he uses the wrong means. The first of these is himself. Nothing can substitute for the personality of the teacher in producing human development. We can train a boy to do arithmetic just as we can train a dog to fetch a stick, but we cannot train anyone to be a democrat. He must be educated to be that, and education is more than a memorization of rules, the conscious acceptance of patterns of behavior, or the repetition of movements. Education leads out of the child the attachments he has to false and harmful antisocial habits and leads into him the sympathies and sentiments which are characteristic of human society, replacing the individualistic responses of the untutored animal with the learned responses of the social, that is, the human, being. In this task something more than an automaton is needed for the "leading." What is devoutly to be sought is a man capable of appreciating the forces of life himself and of presenting them to others in undistorted perspective. The quality essential for such a personality is humility in the true sense of that term—the humility of Socrates, of Jesus, of Einstein. This means essentially that the teacher must not confuse his right to teach—indeed, his obligation to instruct—with the perverse privilege of indoctrination. It means that he accepts the democratic principle of limitation of power in the field of pedagogy as in all other phases of life and that he claims no right to full sway over the personalities intrusted to his care.

At once this points to the fallacy of authoritarianism in any truly democratic educational system. Dogma, by nature, cannot be a legitimate part of instruction in a school that seeks to educate for the democratic way of life. Whether this be the dogma of church, of pseudo-science, or of scientific method itself, it cannot be tolerated in a liberal democratic system. This is not to argue that dogma should be suppressed; there are suitable places for its utterance. It is to argue that the public schools of a democracy can have no valid interest in submitting their charges to such utterances. The teacher's duty is to avoid in his person and his practice all that smacks of authoritarianism. If he speaks from opinion, he must say that it is opinion, not revelation. If he espouses a cause, he must not insist on his pupils' adopting that cause. If he describes the past and present institutions and practices of men, he must not say, imply, or suggest that they are the proper depositories of the rights of men or determinants of the correct courses of human action.

This is what humility means. To respect the inalienable right of every personality to grow unfettered by untruths, half-truths, and suppositions. To encourage the fullest consideration of all the social highroads and byways without falsifying the signposts. Democracy needs only this fair play for its survival and growth. It has no use for the directed opinions and controlled thought of status quo doctrinaires. Its value lies in a buoyant acceptance of the adventure of living, with all the gay excursions into the dangerous and unknown; its worth is found in endless striving for ideals which lie up ahead, luring us on, not in dead-stick ideas, prodding us from the past. When the teacher understands that he carries into the classroom the awesome responsibility of not violating the frontiers of personality, no matter how difficult his task of leadership without such recourse, he has come of age in the democratic way of life. Unless he understands, he will fail to teach democracy; for, though fools often confound the wise and a wise man may learn from a fool, it is impossible that a fool should teach wisdom.

For the purposes of examination, though quite certainly not for the purposes of practice, the teaching goal may be divided into three general objectives. (To study, one abstracts; to practice, one integrates.) These objectives may be given the general designations of the "intellectual," the "social," and the "personal."

In the classroom, as in life elsewhere, these ends are inextricably interwoven, and our separation here is wholly for the purpose of descrying their essences. (By "essence" I simply mean the "to be," the content of the ideal, if ever it were able to achieve perfect realization. Of course, any democrat or liberal must regard such achievement as improbable, if not impossible, and at any rate undesirable, since it would mean the end of change and growth.)

The intellectual objective of the teacher is to impart to those who come to him for guidance a comprehension of the little that is certain, the much that is probable, and that which as yet is undetermined even as to possibility. Boundaries between these areas of human speculation should be as clearly drawn as the talent of the teacher and the nature of knowledge permit. Once made explicit in the over-all picture of thought and knowledge, they afford a greater accuracy in the evaluation of detail in specific fields. Honesty in classifying the degrees and kinds of "knowledge" is absolutely necessary to good teaching. The teacher must not overestimate the validity of any measured "fact" or neglect or ridicule the vast areas of experience which no trustworthy science has mapped but which men continue to traverse by rule-of-thumb. Without the defeatism or the pessimism of the hopelessly mired or the foolish optimism of a new convert to this or that "true way," the teacher must classify speculation as "certified true," "certified as verified or verifiable," or "uncertain without prejudice." Certainly, no greater benefit could accrue to students than their realization of these distinctions, unless it be some instillation of the arts of making such judgments for themselves. This objective alone is sufficiently demanding to call into play all the strength of mind, all the power of will, and all the available time and energy of the teacher. He is saved from futility in the pursuit of his other objectives by the very integratedness of all educational ends: in reaching one, we necessarily approach near the others.

Life is too complex to dally overlong with its broad aspects. Though man does not live by bread alone, it is still necessary that he eat. The tools which knowledge offers must not be too abstracted from the daily process of converting wheat flour into muscle tissue and thoughts of love. Education must look toward the socialization of the individual, toward providing him not only with the basic understanding of knowledge and fancy but with the experience of human motivation in society. To knowledge of principles must be added examples in practice, gained either firsthand or by proxy. To the way of thinking must be added what is to be thought about, or we should find ourselves becoming gods, mere thoughts thinking about thought. The social rigor mortis of a mind attuned only to logic is almost as intolerable a result in education as the St. Vitus's dance of personalities left without an ordering of values. To escape both eventualities, the teacher must provide his students with vicarious, if not direct, participation in experiencing the irrational sentiments and feelings which dominate the workaday world. To lead the student into this proxy experience is thus the essential nature of the social objective.

Irrationality is an even greater concern of education than is rationality, though this has not always been recognized by educators. In the social scene the unreasonable is to the reasonable as the ocean is to the raindrop. What must be carefully avoided in teaching, however, is the equation of irrationality with the socially acceptable or desirable or the implication that, because it is necessary to recognize the irrational, it is also necessary to be irrational. The inability to be clear about the relationship of logic to life is one of the common faults of teachers. Too many seek to avoid the task of leading their students

to a comprehension of the illogical and fall back upon abstractions which bear little resemblance to actual life. Many others are guilty of the opposite escapism: they leave their students with the impression that life necessarily is a mess and that nothing is to be gained by learning to think logically. Awareness is thus taken to mean a consciousness of chaos. To stop at this point is the greatest temptation facing liberal instructors; it is easier to photograph than to paint. The obligation of the teacher, however, is not fulfilled when he depicts the situation without providing any *means* for his students to use in analyzing and interpreting what they observe.

The teacher, of course, is not entitled to "set" values for his students. He should not place anything or any idea as "untouchable." But he is empowered by society to advocate that society's ideals, and it is his duty to direct the minds of his students toward observation and evaluation of those ideals. He cannot rightfully say, "This tenet is the truth," but he should say, "We have found this tenet serviceable" and explain how. He cannot proscribe the students' attention to a single set of ideas, but he can suggest the comparison of one with another, using various criteria. He can lead his students to analyze critically, logically; to avoid blindness to their own predilections; to examine their assumptions as to causes and effects; and to test every idea by its application to specific cases. All this may seem hardly more than saying that the teacher should encourage his students to apply the scientific method, but so many educational crimes have been committed in the name of that method that it is unsafe to use the term without qualification.

The third objective—the personal matter of adjustment of the individual to his environment—grows almost insensibly from attention to the other two. Adjustment is a matter of how a man thinks about his circumstances and what he thinks about himself and others. The classroom can build self-respect and social awareness, leading to respect for others. If a man can think logically, he can control to a great extent his intellectual conclusions; if he can attain a reasonably consistent view of what his real self is and weigh his interests, thus understood, in the social scales against the interests of others, similarly understood, his chance of achieving a satisfactory compromise between self and society is very great. Thus, in attaining or approximating our intellectual and social goals—a theory of knowing and an awareness of events—we achieve or approach our personal-adjustment end.

This integration of objectives might very well be paralleled by integration of subject matter. The artificial classification of "knowledge" into "subjects," such as Literature I, II, and III, has little in common sense to recommend it and no philosophical justification. On the level of research or creative practice, the separation is both natural and desirable, for the first is an examination of details and the second a matter of individual art; but too much separatism on the lower levels of instruction leads to fragmentation of learning and the undesirable consequence of ill-balanced memories. The separation encourages a mastery of one division and a neglect of another. This appears often under the disguise of a "liking" for a particular teacher, a dislike for another. Closer examination may reveal that the flaw lies in the one-sidedness of the instructor, who, as a specialist in mathematics or English grammar, is giantized because he is the master of a subject which naturally appeals to the particular student or, contrariwise, is dwarfed as a whole man in the eyes of some youth who recognizes his inadequacy in fields other than his specialty. This condition can be obviated by integration of subject matter and insistence upon the obligation of teachers to be able to teach in several fields. If we seek well-rounded citizens, we must provide the means to make them so.

This leads us to the fairly obvious fact that all studies are social studies and can have no other nature, so long as they apply to human beings. It is difficult to imagine why anyone should be studying anything dissociated from society, even were such study possible. It is the negation of the student's humanity. Literature, grammar, mathematics—all have social meaning. If there is a core of education—and there is—it is humanity, society itself. To know the continent of knowledge sufficiently well to teach its contours to others, the instructor must recognize that *this* "knowledge" belongs to literature and *that* to politics; but in instruction the boundaries must be noted only to be ignored. It simply isn't possible to see a tree in a splinter; but it is quite easy to realize the multitude of splinters which can exist in a tree. All the education achieved in a system devoted to the splinter-principle of instruction is unearned increment. It is, as a philosopher has noted, what you remember when you have forgotten all you have learned. To this concept of divide the learning and conquer the student's natural desire to be a whole person is opposed the idea of adapting special subjects to the task of education as defined in this paper. Because his subject is English or physics, the teacher is not absolved from contribution to the social awareness and personal adjustment of the pupil. He is, essentially and necessarily, a teacher of the social, though we should, in the instance of many subjects, refrain from marking him with the stigmata of "science." He is, if he teaches, an artist. He must know and apply techniques, but, since every application is individual and personal, the methods of his task do not warrant the title "scientific," which is rightly reserved for the generalized laws applicable to mass phenomena. When the task of all teachers is clearly understood to be the introduction of students to the living of life, with the hope that skilled leadership may guide them to a greater clarity as to the possibilities of social change and a greater grasp of the means whereby the potentialities may be realized, the fitting of "subjects" into the curriculum will be an easy task. It is the confusion in principles, not the difficulties of means, which is the barrier.

These things the student has the right to expect: that his instructor will encourage him to be aware of the way he thinks, the actualities of the learning process, the scope and limitations of knowledge—the extent of the verifiables, the domain of the unsure, and the powers of logic; that his teacher will lead him through the mazes of social and physical phenomena until he has the opportunity to become conscious of their nature, causes, and effects; and that the school will provide for him an honest and clear picture of the alternative value systems which are self-consistent and mutually exclusive, with positive suggestions as to the results obtainable from each of them. If these obligations are met, the student, granted capacity, will be able to recognize and analyze his own and society's problems, establish for himself a satisfactory value system, and adjust himself to circumstances. The threefold goal of democratic education—social awareness, intellectual fitness, and personality adjustment—will thus be achieved. The present system hardly touches these ends. Surely, that is sufficient justification for a change.

VARIETIES OF EXPERIENCE IN *DON QUIXOTE*

Perry J. Powers

I

THREE years ago the world celebrated the four hundredth anniversary of the birth of Miguel de Cervantes Saavedra (1547–1616). In the Spanish-speaking countries there were elaborate programs of homage; Mexico celebrated with a "Cervantes Week," productions of his plays, a literary contest, and even a commemorative postage stamp. There were less spectacular programs in England, France, Austria, and Russia. In the United States and Canada the academic world paid its tribute with lectures and articles. Angel Flores and M. J. Benardete published a collection of excellent articles,[1] and Aubrey F. G. Bell, the eminent British Hispanist, published his study, *Cervantes*.[2] And yet, the late Samuel Putnam pointed out in the Introduction to his recently published translation of *Don Quixote:* "Our men of letters, who should have been especially concerned, and the more literate reading public were for the most part unaware of the occasion. . . ."[3] The "literate reading public" seems content to relegate *Don Quixote* to the group of "classics" that one knows about but need not take the time or trouble to read, and certainly not in their entirety. A vague recollection of something about windmills is deemed adequate evidence that one has brushed with the work, which one will generally concede to be "great."[4] And now that the anniversary year is past, probably some of the academicians who were stirred to unwonted activity will place the work back on the shelf and not intrude upon the adventures of the Knight of the Mournful Countenance for years to come.[5]

Surely, one of the reasons for the disinclination to read the *Quixote*—and I am referring to readers in English-speaking countries—has been the embarrassing problem of an adequate translation. Mr. Putnam has done much to help solve this problem with his version, which is readable and intelligent. This is only part of the story. I suspect that there are more profound reasons why the *Quixote* is read as little as it is, reasons that reflect spiritual and cultural characteristics of our age. Cervantes addresses his public as the "idling reader," and we are asked to suspend our preoccupation with the business of the world.[6] This is more diffi-

[1] Angel Flores and M. J. Benardete (eds.), *Cervantes across the Centuries* (New York: Dryden Press, 1947).

[2] Norman: University of Oklahoma Press, 1947.

[3] Miguel de Cervantes Saavedra, *The Ingenious Gentleman Don Quixote de la Mancha: A New Translation . . . by Samuel Putnam* (2 vols.; New York: Viking Press, 1949). It may well be that this translation will stand as the major contribution to the comprehension of this work in English-speaking countries. All quotations in this article are from this translation.

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[4] Aubrey F. G. Bell has expressed his fear that *Don Quixote* may be joining "Dante and Milton, Shakespeare and the Bible, in being universally praised but comparatively seldom read" in an article, "The Wisdom of Don Quixote," *Books Abroad,* XXI (1947), 259–63.

[5] There seems to me to be a danger in popular lectures on great books. They may induce a lack of responsibility toward the work itself, the auditor believing that he has experienced the book through the lecture and that therefore he need not read it. I do not think that it is safe to assume that the activity of 1947 created a public that is reading *Don Quixote.*

[6] Boccaccio in a similar manner insists that we set aside other matters if we would read the *Decameron* by assuming that his readers will be "gentilissime donne," noble ladies who seek distraction from idleness.

cult than it appears, and we will hesitate to commit our "idle" hours to an occupation that will require, we suspect, a generous expenditure of intellectual energy and a degree of concentration which we are not accustomed to give to distractions. If we are candid, we may admit that we are somewhat lacking in that creative composure which receives, contemplates, and experiences a work of art, particularly a work of a large dimension. *Don Quixote,* the *Divine Comedy,* or *Tom Jones* requires a quantity and quality of spiritual repose that the modern world will grant us only grudgingly. And yet it would seem that this condition of mind and spirit necessary for the contemplation of art (or life, or nature, or anything) is an essential quality of the educated, cultivated person who enriches his life with the experiences of other lives communicated in the intensity of art. What I have called "creative composure" may not be inherently present in all of us, or it may be stifled by the daily routine of business. In any case it is a quality that can (and must, if we are to reach any valid maturity) be developed, and developed precisely by the discipline of receptive exposure to the work of art.

In *Don Quixote* Cervantes offers to our contemplation a world that is infinitely complex and rich, in action and movement, in characters, in language, in idea, in humor, in love and devotion, in anguish and pain. To experience this world requires the participation of most of our faculties, for Cervantes demands no less of his reader than the full man. And in this experience our faculties and perceptions grow. Cervantes asks us neither to accept nor to reject this world but only to behold what he has to show us. To make sure that our relationship to it is correct, he tells us that he himself is only a stepfather to his hero and that we are "neither relative nor friend, but may call your soul your own and exercise your free judgment. . . . All of which exempts and frees you from any kind of respect or obligation; you may say of this story whatever you choose without fear of being slandered for an ill opinion any more than you will be rewarded for a good one."[7] To prevent us from losing our critical perspective, Cervantes keeps us always beside him. He tells us what he wants us to know, first in his own person ("In a village of La Mancha the name of which I have no desire to recall . . ."[8]), then through the mask of the Arab historian, Cid Hamete Benengeli.[9] Unlike the hero, we cannot go mad because of an identification that we might make with Don Quixote and ourselves.

Our experience is not to be a hurried one. There is time to grant us a complete, ever deepening, and growing knowledge of Don Quixote and Sancho Panza, to know them as they are at one moment and as they develop through their own experience and knowledge of each other. Our experience, as readers, is of these individuals (and many others in the book) and through them, but it is never identical with the experience of any one or several of them; for our experience is the experience of the author, the creator, which embraces with love and humor the experiences of any one or all of the characters but, at the same time, transcends those experiences. Similarly, the experience of a spectator at the theater transcends the individual or collective experience of the individuals in the play.

Experience is significant or trivial to the degree that it has meaning for us, and meaning is largely determined by a sense of reality, which judges the experience to be more or less real. Since the time of Plato, men have been told repeatedly that the quality of their lives will depend upon their concept of re-

[7] Prologue, p. 11. It has been suggested that it is this attitude of author and reader as much as any other quality of *Don Quixote* that makes it a modern novel.

[8] I, i, 25.

[9] I, ix, 72.

ality, for it is what we hold to be real that determines the direction of our growth. Education, then, consists largely in an ever growing awareness of the complexity of reality, in the ability to distinguish between reality and appearance, to treat appearance for what it is, and to bring our lives into harmony with the real. But our concept of reality is likely to be static unless there are suggestions and perceptions which come to us from some source outside ourselves. Thus a book whose very life derives from the conflict between reality and appearance could have considerable significance in the process that we call "education." *Don Quixote* is such a book, for, as Lionel Trilling observes, in it "the problem of reality is central."[10] Any comprehensive discussion of the *Quixote* will lead inevitably to an unfolding of this problem and the meaning of the problem for Cervantes and for the reader.[11] Any particular attempt, such as this one, can be only partially successful.

II

Cervantes gave to the world a strange book whose hero is a madman, for he believes that windmills are giants, that inns are castles, trollops virgins, and a barber's basin a magic helmet. And this self-christened "knight" has with him a squire who is greatly troubled by his master's visions and whose primary function, according to some critics, is to restore balance in his master and correct his illusions.[12] The *Quixote* is the narration of the adventures of these two men through some thousand pages; and, lest this tale become monotonous, Cervantes has included a number of stories which are told or read to Don Quixote and various dramatic scenes which are witnessed by Don Quixote or in which he takes part.

The First Part (published in 1605) of the work ends with Don Quixote's return home, locked in a cage and convinced that he has been enchanted. Ten years later Cervantes published the Second Part of *Don Quixote,* which continues the adventures of our two heroes and which brings them to a full close with Don Quixote's return to sanity and his death. A year before this Second Part was published and while Cervantes was working on the last chapters, there had appeared a continuation of the First Part by a certain Alonso Fernández de Avellaneda, who has never been identified. Whoever he may have been, the author makes bitter personal attacks against Cervantes; and the book itself, although not without a certain intrinsic interest, does no justice to Cervantes' work. We shall have occasion to return to this "false" *Don Quixote* later, for Cervantes in the Prologue to the Second Part and in the last chapters of the *Quixote* discredits this book of a rival.

Now this *Don Quixote* is a very amusing book. Cervantes, as he tells us in the Prologue to the First Part, is intent upon destroying those monstrous novels of chivalry which had been produced in such great numbers in Spain during the first half of the sixteenth century. And, to accomplish this end, he creates a parody of the knight-errant—a ridiculous figure whose madness does not allow him to see things as they are. Quixote is constantly frustrated, it would seem, in his knightly career, and the result is comedy. If we find the comedy a little brutal at times, we can in all probability account for this by a change in taste. The men of the Renaissance had strong stomachs. It amuses us that Don Quixote addresses young females of uncertain reputation as though they were great and chaste ladies. The incongruity of the scene is

[10] "Manners, Morals, and the Novel," *Kenyon Review,* X (winter, 1948), 14.

[11] A. Castro writes: "The fascination of this work does not stem from the prodigious inventiveness of the author, but from this primary idea which permeates the richness of his imagination, with incalculable significance" ("Incantation in *Don Quixote,*" in Flores and Benardete, *op. cit.,* p. 139).

[12] Cf. Bell, *Cervantes,* p. 121.

one of the basic elements of the comic experience. It amuses us that Don Quixote conceives the windmills to be giants and challenges them in the high, oratorical phraseology of medieval knighthood. Here the same lack of congruity between external reality and Don Quixote's insane vision directs sonorous and heroic words to objects incapable of proper response.

The book is comic, and Don Quixote is mad. But if we read the *Quixote* carefully, we shall discover that we are asking ourselves many questions; and, if we attempt to answer these questions, we shall find that we are dealing with a work of art, highly complex in character. We may, for example, ask about the nature of comedy in this book. To outline a brief answer to this question, let us consider the episode mentioned above, one of the most famous in the book. Don Quixote and Sancho discover some thirty or forty windmills on the plain. To Sancho they appear as they are in reality, windmills; but to Don Quixote they are unnatural giants who offer the knight the opportunity to win fame and fortune by defeating them in most dreadful and unequal combat. This is Sancho's first experience with his master's peculiar vision, and his simple question moves us to smile. "What giants?" asks Sancho. "Those that you see there," replies his master, "those with the long arms, some of which are as much as two leagues in length." Sancho objects, but Don Quixote only answers with patient superiority: "It is plain to see that you have had little experience in this matter of adventures: they are giants." Don Quixote then challenges the windmill-giants: "Do not seek to flee, cowards and vile creatures that you are, for it is but a single knight with whom you have to deal!" The wings of the windmills are turned by a chance gust of wind. "Though you flourish as many arms as did the giant Briareus, you still have to answer to me." Commending himself to his lady, Dulcinea, Don Quixote charges the windmill, and horse and rider are rudely thrown.[13]

The comic elements of which I have spoken are all here: the violent incongruity of Don Quixote's words of challenge direct to windmills; the attack, which is an extension into action of Don Quixote's madness and is perhaps even farcical; the very presence of Don Quixote in a setting which refuses to correspond to his illusion. Then there is the element of frustration, which is also comic to the extent to which we are disinterested observers. But herein lies a problem, for Cervantes has already caused us to sympathize with his hero and, to a limited degree, to experience what Don Quixote experiences. Now this frustration in Don Quixote's world of experience is the frustration of noble intention—for the highest motives underlie his knight-errantry, as we shall see. This experience is, for Don Quixote, far from comic. Consequently, we are amused to the extent that we are observers watching the action from a safe distance—a safe distance emotionally, that is—but we suffer to the extent that we identify our sympathies with Don Quixote. It is the genius of Cervantes to keep these two perspectives—that of Don Quixote and that of the dispassionate but interested observer—always in balance and never to allow us to lose this equilibrium. The result: we "laugh through tears."

The scene is further complicated by Sancho. Suffice it to say for the present that Sancho is a simple soul of great faith in Don Quixote, who wants to govern the island which Don Quixote has promised him. His perplexity at his master's decision to attack these "giants" and his consternation at the unhappy outcome of the "adventure" form an integral part of the humor of this scene. But we are not without feeling for Sancho, and, in a sense, we see Don Quixote through the eyes of his squire. It is an unsettling sight for one who has so re-

[13] I, viii, 63.

cently taken to the profession of squire. This master in whom he has placed so much confidence mistakes windmills for giants. For Sancho this is not funny. But we are not Sancho, rather are we, with Cervantes, observing and smiling. Thus it is that we watch this scene from three points of view: first, that of the objective observer who follows Don Quixote and Sancho with dispassionate interest; second, from the point of view of Don Quixote to the extent that Cervantes allows our sympathy to be identified with the knight; and, third, from Sancho's point of view. Cervantes is able to analyze these perspectives, interlocked yet opposed, and to produce a poetic whole which, like great poetry, is more than the sum of its parts.

It is apparent from this one episode that the comedy of the *Quixote* is splendidly complex, ranging from farce to what could be tragedy if it were not for the careful control of the artist's hand. Our reaction to this comedy is equally complex and exists simultaneously upon several planes, and yet the emotion is a synthesis which we can analyze only in retrospect.[14]

We may now ask: Why did Cervantes write the *Quixote*? What was his purpose in creating a work of such proportions? These are relevant questions to put to Cervantes precisely because he states his purpose in the Prologue to the First Part: ". . . you have no other object in view than that of overthrowing the authority and prestige which books of chivalry enjoy in the world at large and among the vulgar . . . ," his friend observes. And this purpose is surely accomplished. The creation of the knight Don Quixote is in itself a parody of the knight-errant, and the books of chivalry —or most of them—which drove the good man to madness are formally burned by such sensible people and friends of Don Quixote as the town barber, the priest, and the ladies of Don Quixote's household. A few of the more notable works, among them *Amadís de Gaula* and *Palmerín de Inglaterra,* are spared, but the rest—and there are many of them—go to the pyre condemned as wizards and witches, dangerous to public sanity. This is the end of the books, and we are only in chapter vi of the First Part; do we need one hundred and twenty more chapters just to destroy the authority and acceptance of the novels of chivalry? The only reasonable conclusion is that, although Cervantes' original purpose may have been to discredit the novels of knight-errantry, this purpose was soon superseded by another of greater dimension.

It may be suggested that Cervantes was not so much interested in casting the books themselves into the fire as he was in pointing out the danger of vicarious existence through, or by means of, books. One whose life is lived in works of fiction loses contact with reality, mistakes barbers' basins for magic helmets and sheep for armies, confuses the real with the unreal. I doubt that we can accept this proposal as a full and satisfactory explanation of a work as complex as the *Quixote,* for how, then, could we explain the marvelous lucidity of Don Quixote's speeches (of which more presently) or his power to attract other characters and the reader into his world.

What explanation, then, can we offer

[14] The reader's experience becomes increasingly complex as the action progresses. The reader should analyze for himself his reactions to the splendid scene of the festive reception at the palace of the duke and duchess in chapters xxxi and xxxii of the Second Part. Present are the duke and duchess, Don Quixote's hosts, who know him and Sancho not only as the persons of "flesh and blood" who are present but also as the protagonists of a book (i.e., Part One). Present also is an unimaginative priest who upbraids Don Quixote for his insane behavior and to whom Don Quixote makes a brilliant apology for the existence of the knight-errant. Since the duke sides with Don Quixote, for he does not wish to have his fun spoiled, the priest leaves in indignation. The duke then grants Sancho the island he has been promised by Don Quixote. Not only are the relations of the individuals to one another complex, but the reader, embracing all these complexities, integrates them into a unified experience.

for the growth of this book from a primary stage of criticism of a literary type, the novel of chivalry, into a work of universal scope? Does not the solution perhaps lie in the fact that Don Quixote and Sancho offered Cervantes an excellent means of examining the world, its literature, its philosophy, even its metaphysics, and from many points of view? It is probable that Cervantes realized the full potentialities of his creation only after he had created it, and, having been granted the breath of life, the creation refused to die. Cervantes could not help experimenting with his characters, bringing them face to face with very serious problems of spiritual, intellectual, and physical life. The possible refractions of reality through the eyes and minds of Sancho and Don Quixote must have seemed infinite to Cervantes, as, indeed, they are. And one of the miracles of this technique is that it is impossible to state any position as final, for our reasoning powers never give complete assent to Don Quixote or to Sancho. Don Quixote is a madman, and argument from his lips cannot be final. Sancho, on the other hand, is limited by his empiricism. All observation is experimentation, and one perspective is balanced by another or by several others.

But how does Cervantes give unity and vitality to this long narrative: Is *Don Quixote*, like the novels of chivalry before it, simply a long series of adventures in which the only unity is the person of the hero? Are Don Quixote's digressions on the Golden Age (I, xi), on poetry (II, xvi), or on the drama (I, xlviii), are the stories and dramatic episodes, nothing more than bits of foreign matter, so to speak, passages which offer us repose and variation? A consideration of these questions would lead us, I suspect, to the conclusion that the *Quixote* is much more than a series of events, that it possesses a unity as a work of art and a momentum that carry it forward with ever increasing power and vitality. Experience in the *Quixote* is cumulative, meanings multiply. The digressions and the narrations are functional and organic in the book, they seem to rise spontaneously from the context, and they offer new backgrounds against which to study reality and ideas.

As Cervantes' book broadens and deepens, it takes unto itself all the currents of Renaissance culture; all the important prose forms become a part of the *Quixote*, the pastoral, the chivalrous, the short story, the essence of the dramatic without its form, even poetry. And to counteract and interact with the aristocratic world of idea, Cervantes introduces the wisdom of the common people and their "literature," the proverb.

If space allowed, we might examine the manner in which Cervantes fuses these elements into a whole, how he plays with them, as it were, in the sheer joy of artistic virtuosity and experimentation. And Don Quixote and Sancho are the instruments for these experiments, the sounding boards, the active agents that convert these many themes and subjects into art.

This brings us to a central question: What is the character of our strange hero and of his almost equally strange squire? We may now anticipate that the answer will not be simple, and this is why I have postponed discussing this problem until this point in our analysis.

We must first study the character of Don Quixote as Cervantes presents him to us. Cervantes tells us that Don Quixote was "close on to fifty, of a robust constitution but with little flesh on his bones and a face that was lean and gaunt. He was noted for his early rising, being very fond of the hunt" (I, i, 25). He was, in short, a village squire of limited means, whose table was modest, whose wardrobe was unpretentious, and whose household was managed by a niece and a housekeeper. In the Prologue Cervantes refers to Don Quixote as his son, "dried up, shriveled, and eccentric: . . . [one] filled with thoughts

that never occurred to anyone else";[15] but the filial relationship is reduced shortly, as I have noted, to that of stepson, for he makes no plea in behalf of Don Quixote. This curious person had nothing in common with the vigorous young heroes of epic romance. Indeed, he would be no hero at all except for one characteristic: he is quite mad. This is the paradox, then: that instability of mind engenders the heroic stature of his character. And his madness comes from reading books of chivalry, as we have seen. To buy them, he sold his land, and, to read them, he wasted his nights and days, until, as Cervantes says,

> from so little sleeping and so much reading, his brain dried up and he went completely out of his mind. He had filled his imagination with everything that he had read, with the enchantments, knightly encounters, battles, challenges, wounds, with tales of love and its torments, and all sorts of impossible things, and as a result had come to believe that all these fictitious happenings were true; they were more real to him than anything else in the world [I, i, 27].

Amadis of Gaul, Palmerin of England, and a host of other heroes from the books became more real for our gentleman than his village friends, the barber and the priest.

> At last [Cervantes says], when his wits were gone beyond repair, he came to conceive the strangest idea that ever occurred to any madman in this world. It now appeared to him fitting and necessary, in order to win a greater amount of honor for himself and serve his country at the same time, to become a knight-errant and roam the world on horseback, in a suit of armor; he would go in quest of adventures, by way of putting into practice all that he had read in his books; he would right every manner of wrong, placing himself in situations of the greatest peril such as would redound to the eternal glory of his name.

He provided himself with arms, christened his horse "Rocinante" and himself "Don Quixote de la Mancha."[16] The village maid whom he chose as lady of his heart was called Aldonza Lorenzo, but a name so common was never found in the books of chivalry, so he resolved to call her "Dulcinea," adding "del Toboso" from the place where she was born. Don Quixote had prepared himself physically and spiritually for his great mission, and one morning before daybreak in the heat of July he left his home with the greatest secrecy to venture forth on his long series of adventures.

It is hardly necessary to suggest that this hero was to be a new experience to the readers of Cervantes' time. The knight-errant of the romances of chivalry was familiar enough, and that fact Cervantes could take for granted in the creation of his character. These men, moreover, had been taken seriously by their creators and chroniclers, and the deeds of heroism, often of the most extravagant character, were presented without irony. Cervantes, in a sense, revives this hero but presents him from an entirely new and fresh perspective. First of all, Don Quixote chooses by his own free will to *imitate* the actions of the knight-errant. It is Don Quixote himself who revives the knight-errant, who would re-create him and his mission in the world. But, to move from the contemporary world into an imaginary world of the past, to act as though that imaginary world were the contemporary world, and particu-

[15] Putnam would have us believe that it is the book that is "dried up, etc." The Spanish text makes it quite clear that Cervantes is referring to Don Quixote: ". . . sino la historia de un hijo seco, avellanado, antojadizo y lleno de pensamientos varios y nunca imaginados de otro alguno . . ." (". . . except the story of a son, dry, whimsical and filled with strange thoughts never before conceived by anyone . . .").

[16] His real name is a matter for speculation. "They will try to tell you that his surname was Quijada or Quesada—there is some difference of opinion among those who have written on the subject—but according to the most likely conjectures we are to understand that it was really Quejana. But all this means very little so far as our story is concerned. . . ." (I, i, 25–26). In the last chapter of the Second Part he calls himself "Quijano the Good."

larly to blind one's self so to material reality that the windmills are seen as giants is to be mad.

Within his own world of illusion Don Quixote's mind functions with perfect logic and clarity, and he speaks with learning and wisdom. He may mistake windmills for giants and wenches for gentle ladies, but in his advice to Sancho on governing his island, in his discourse on the Golden Age or on poetry, in his defense of the life of the soldier over the life of the scholar, in everything, as Sancho so often remarks, except that which has direct bearing upon the profession of chivalry, Don Quixote speaks as one completely sane.

In his madness, in his vision, lies Don Quixote's own reality. Don Quixote carries his world of values and perspectives within him, and these he imposes uncompromisingly upon the external world. Don Quixote lives a dream, a dream which exists only in his own mind but which he projects into the future as he rides forth on his first sally.

> He . . . continued on his way, letting his horse take whatever path it chose, for he believed that therein lay the very essence of adventures. And so we find our newly fledged adventurer jogging along and talking to himself. "Undoubtedly," he is saying, "in the days to come, when the true history of my famous deeds is published, the learned chronicler who records them, when he comes to describe my first sally so early in the morning, will put down something like this . . . ,"

and there follows a highly poetic description of dawn breaking over the Mancha. He then continues: "'O happy age and happy century in which my famous exploits shall be published, exploits worthy of being engraved in bronze, sculptured in marble, and depicted in paintings for the benefit of posterity.'"

Don Quixote is a new medium through which the world is viewed, a new prism through which reality is refracted; and the whole book is, in a very real sense, a study of this phenomenon of refraction. His existence demands castles, ladies, knights, and a wholly pure love as much as ours demands food and air.

Don Quixote's purpose in restoring knight-errantry is to undo all manner of wrong; the form in which this is to happen, dangerous adventures; the setting for his deeds, the world; and the motive, eternal honor and renown. Our sympathy and admiration are with this man who is determined to transcend an existence limited by material objects. The frustration of this heroism would be matter for tragedy if Cervantes allowed us to identify our point of view solely with that of Don Quixote.

A Spaniard of our century, a modern Don Quixote, who has refused to allow Cervantes to intrude between him and Don Quixote was Miguel de Unamuno. He assures us again and again in his works that the truly vital forces of life are irrational and in a state of perpetual war against our reason. For Unamuno, Don Quixote is the hero of life who does battle with those forces which bring death to man. He was mad only because he was alone in his vision. This knight was

> no lad pursuing blindly some unknown path, but an intelligent and clever man who goes mad from sheer maturity of his mind. Alonso Quijano lost his reason, to gain it again in Don Quixote, a glorified reason. His mind was filled with beautiful fancies, and he took to be true that which was only beautiful. And he believed with such burning faith, with a faith so productive of works, that he determined to turn into fact that which his fancy dictated, and by the power of belief he made it a reality.[17]

And by the power of *his* belief Unamuno would make us believe.

But Cervantes will not take sides, he will only explore. In a strange way, however, Don Quixote's fantastic projects do become a reality. He says that he will do great deeds, and so he does, although to the observer he appears to come away the worse for them. He says that he will

[17] Miguel de Unamuno, *Vida de Don Quijote y Sancho* (4th ed.; Madrid, 1931), pp. 27 ff.

become a knight as famous as Amadis, and no one will dispute that he has. There are statues of the knight of the Mancha all over the world, and his deeds are recorded in painting, drawings, and sculpture, as he predicted. Nor will many deny that a great book was written of his adventures. Even his promise to Sancho that his squire will one day govern an island is realized in a strange way. Everything is possible, Don Quixote says—but, Cervantes would add with a smile, not always possible in the manner or form intended.

Don Quixote, as Unamuno says, quite deliberately chooses a new reality. He *wills* himself and his world into existence, and he does so with words. Don Quixote comes into being at the moment the character whose "real" name is not even accurately known baptizes himself with the knightly title of "Don Quixote." And this Don Quixote is a new man who exists in no vital relationship to his former being. This is a new life with a new purpose, and a new world inhabited by new beings and governed by new laws. And in this world reality is not a matter of "things" but of ideas, and, with the symbol of the idea—the word—Quixote creates an external reality which corresponds to the idea. With the words "Don Quixote" he creates himself, with the word "Rocinante" he creates a charger out of a nag, and with the magic of "Dulcinea" he creates the love which is to be the soul of his new existence.

In chapter ii, our new man sets out across the plain of the Mancha, and he realizes that he is not yet a knight, that the ritual is not yet complete, for he must be properly dubbed a knight. With this thought in mind, he arrives at an inn which must, of necessity, be a castle, and standing in the doorway are the girls who must, of equal necessity, be fair damsels. When a swineherd blows his horn, it must be a dwarf announcing Don Quixote's arrival, and the innkeeper must be the noble knight who will dub him. Now all this is perfectly consistent within itself, and that it is inconsistent with fact matters not at all to Don Quixote. Of what good would an inn be when what he needs is a castle?

There follows, then, Don Quixote's first encounter with the old, unregenerate world which resists his categories; now for the first time the different planes of reality come into immediate contact with one another, and a rather remarkable thing happens. After their initial surprise at seeing such an extravagant character appear at the inn, the innkeeper and his friends adjust themselves —"reconcile themselves," says Cervantes —to their new guest's strange imaginings. The girls behave like ladies, and the innkeeper himself promises to knight Don Quixote on the morrow, after the customary vigil during the night. Don Quixote's world has, in a sense, triumphed and has forced the innkeeper to recognize it—and Don Quixote—as a reality. Not in the sense that Don Quixote believes, to be sure, since the inhabitants of the inn accept Don Quixote with irony. Yet the power of his imagination has imposed itself upon them, and the world of material reality yields to a degree and does not reject him. During the ritual of the knighting of Don Quixote, the innkeeper goes so far as to offer him valuable advice in the career of knight-errantry. Among other things, he tells Don Quixote that no knight can be without a squire. This incompleteness will soon be remedied, for Don Quixote will find a squire in Sancho Panza.

During Don Quixote's vigil in the patio, there arrives a muleteer who wishes to give water to his animals. Don Quixote's arms have been placed upon the trough, and the muleteer must remove them if he is to get at the water. Don Quixote warns him that the arms are not to be moved and that, if the muleteer persists in his madness, he will be punished. The muleteer considers Don Quixote's warning to be the raving of a lunatic and goes about his business, whereupon Don Quixote deals him a

blow that stretches him upon the ground. This base creature would have none of Don Quixote's nonsense; he *does* reject Don Quixote's reality. He is the positivist for whom there is no truth but material truth, and it is right and just that Don Quixote should smite him, for his is the mentality which will destroy Don Quixote; he is the most dangerous enemy of all.[18]

Here are three levels of meaning: first, Don Quixote, who perceives but one reality; second, the innkeeper, who knows that Don Quixote is mad but who pretends; and, last, the muleteer, who refuses to pretend. These three perspectives give Cervantes the opportunity to examine truth, reality, and experience from all sides. Reality is reflected to us as from three mirrors, and reflected simultaneously, so that we perceive at the same moment three possible truths. Cervantes never pronounces in favor of any one of these truths but allows them to exist side by side or superimposed one upon another, creating from the relationship of one reality to another a work of art of great variety and depth.

Don Quixote, as we have observed, is not yet complete—he needs a squire. He needs someone to talk to, as Unamuno says, and we the reader need someone for him to talk to, for Don Quixote can reveal his world to us only through words. It is a world which we cannot perceive without revelation. Consequently, one of the primary functions of Sancho is to listen to Don Quixote.

One wonders if there is a great character in literature who has been misinterpreted as often as Sancho. He is a good soul, cowardly perhaps, but loyal, loving, and as real as the soil of Spain of which he is a part. But to conceive that he represents the spirit of "good sense" is a grave error. Would a man of "good sense" abandon his home and family for the promises of a madman? And if Sancho had "good sense," would he remain with Don Quixote after the experience with the windmills? How, then, could he believe in his master's promises? For would not Don Quixote appear completely insane to a man of good sense? Good sense is static; it does not need to change, for it believes that it is a stable value in itself. Sancho is not static. He wants to change, he wants to be more than he is. He is awed by and attracted to Don Quixote's world, which is the same as saying that he is awed by Don Quixote's language, by Don Quixote's words. Bit by bit Sancho perceives the world which is Don Quixote's, so foreign actually to his own; and there is considerable struggle, suffering, and ingenuity in his attempts to harmonize his own world of experience with that of his master. It is quite correct to speak of the "Quixotizing"[19] of Sancho, who is an adept student and disciple.

Cervantes finds his scene infinitely enriched by the presence of Sancho, who perceives external reality in the usual manner and is always present to act against Don Quixote's vision. Yet, in the clash between the two realities which results, it is always Don Quixote's which triumphs, for Sancho continues to serve him to the very end. Don Quixote's words are more real for Sancho than the reality which his senses perceive.

Let me refer once again to the adventure of the windmills, for it is an archetype for all the adventures. Don Quixote says to Sancho: ". . . you see there before you, friend Sancho Panza, some thirty or more lawless giants. . . ." Sancho sees only windmills and tries to disillusion his master, but without success. After knight and horse have been thrown by the windmill, Sancho runs to his master's aid with words of reproach: "Did I not tell your Grace . . . that those were nothing but windmills . . . ?" "Be quiet,

[18] Another such character is the priest in the duke's palace in chapters xxxi and xxxii of Part Two.

[19] Unamuno (*op. cit.*) speaks of "quixotic Sancho" (p. 80), and, addressing him, says: ". . . and now you are quixotizing yourself" (". . . te estás enquijotando ya") (p. 92).

friend Sancho," said Don Quixote. "Such are the fortunes of war, which more than any other are subject to constant change. What is more, when I come to think of it, I am sure that this must be the work of that magician Freston, the one who robbed me of my study and my books, and has thus changed the giants into windmills in order to deprive me of the glory of overcoming them, so great is the enmity that he bears me; but in the end his evil arts shall not prevail against this trusty sword of mine." "God's will be done," replies Sancho, helping his master onto his horse. Don Quixote goes on to cite for Sancho's benefit various adventures from the books of chivalry.

Sancho, strangely enough, accepts Don Quixote's explanation. It is not Sancho, as Aubrey Bell believes, who balances and corrects Don Quixote's illusion, but rather it is Don Quixote who directs Sancho's education in the way of faith. It is in the conversations after these unfortunate encounters that difficulties and apparent contradictions are smoothed away and Sancho is reintegrated into Don Quixote's world. For as a man often doubts the wisdom and goodness of God, so Sancho often doubts the validity of Don Quixote's vision. The world as men see it, Don Quixote tells him, is often given a false appearance by some magician. For this reason, Don Quixote is never overcome by the world, and Sancho, too, with some skepticism, is willing to accept this explanation. Don Quixote is the knight of faith who must struggle against a debasing materialism, and Sancho is the squire of faith who grows by faith in his master, by faith in those forces which move Don Quixote and which have the power to alter material reality. Don Quixote inspires in Sancho an ideal of being more than he is. "You should know, Sancho," says Don Quixote, "that one man is no more than another unless he does more than another."

And Sancho learns. In the Second Part, Don Quixote compliments him on the discretion of his speech. "It must be that some of your Grace's good sense is sticking to me," was Sancho's answer. "I am like a piece of land that of itself is dry and barren, but if you scatter manure over it and cultivate it, it will bear good fruit." And Sancho does bring forth good fruit. He is given an island to govern in the Second Part, and Sancho's judgments are so just and so wise that even Don Quixote is surprised.

And, finally, at the end it is Sancho who lives in Don Quixote's world and would resurrect a man who died, not in bed, but at the moment he ceased to be Don Quixote and became simply Alonso Quijano:

> "Ah, master," cried Sancho through his tears, "don't die, your Grace, but take my advice and go on living for many years to come; for the greatest madness that a man can be guilty of in this life is to die without good reason, without anyone's killing him, slain only by the hands of melancholy. Look you, don't be lazy but get up from this bed and let us go out into the fields clad as shepherds as we agreed to do. Who knows but behind some bush we may come upon the lady Dulcinea, as disenchanted as you could wish. If it is because of worry over your defeat that you are dying, put the blame on me by saying that the reason for your being overthrown was that I had not properly fastened Rocinante's girth. For the matter of that, your Grace knows from reading your books of chivalry that it is a common thing for certain knights to overthrow others, and he who is vanquished today will be the victor tomorrow."

Don Quixote's life, his reality, have so captured Sancho that it is now Sancho who would urge his erstwhile master to return to the heroic life.

There is yet one more question: Does Don Quixote really believe in the objective reality of his dreams? It is possible that at the beginning of his new life, Don Quixote is quite unconscious of the disparity between the "word" and the "thing." If this is true at the outset, very probably it is not true later on. Don Quixote asks Sancho if he still has Mambrino's helmet with him. Sancho, who

sees the helmet as a barber's basin, replies with some annoyance.

"God alive, Sir Knight of the Mournful Countenance," said Sancho, "I cannot bear in patience some of the things that your Grace says! Listening to you, I come to think that all you have told me about the deeds of chivalry and winning kingdoms and empires and bestowing islands and other favors and dignities is but wind and lies, all buggery or humbuggery, or whatever you choose to call it. For when anyone hears your Grace saying that a barber's basin is Mambrino's helmet, and after four days you still insist that it is, what is he to think except that such a one is out of his mind?"

"Look, Sancho," said Don Quixote, "by the same God I swear that you have less sense than any squire in the world ever had. How is it possible for you to have accompanied me all this time without coming to perceive that all the things that have to do with knights-errant appear to be mad, foolish, and chimerical, everything being done by contraries? Not that they are so in reality; it is simply that there are always a lot of enchanters going about among us, changing things and giving them a deceitful appearance, directing them as suits their fancy, depending upon whether they wish to favor or destroy us. So, this that appears to you as a barber's basin is for me Mambrino's helmet, and something else again to another person. It was a rare bit of foresight on the part of the magician who is on my side to have what really is the helmet appear to all others as a mere basin; for if it were known that it is of so great a worth, everyone would pursue me and endeavor to deprive me of it."

If things can appear to be what they are not, then one of the greatest problems of life is to learn how to *see* reality as it is. And that, in substance, is what Don Quixote tells Sancho again and again: "Sancho, you do not know how to see."

Don Quixote writes a letter to Dulcinea, which Sancho is to deliver, but Sancho does not know Dulcinea and asks who she is. When Don Quixote tells him that she is the daughter of Lorenzo Corchuelo and Aldonza Nogales, Sancho laughs. So Aldonza Lorenzo is Dulcinea del Toboso. She is a fine girl, robust, good-humored, and has the loudest voice in the whole countryside. But she's hardly a princess, and she surely will not understand the letter. And Don Quixote tells him the story of a young widow, rich and beautiful, who fell in love with a coarse little servant of the house. The lady's family had become more than a little disturbed, and asked her why she didn't choose a more worthy lover, to which she replied: "You are mistaken, your Reverence, and very old-fashioned in your ideas, if you think I have made a bad choice by taking So-and-So, stupid as he may appear to be, since so far as what I want him for is concerned, he knows as much and even more philosophy than Aristotle himself." And then Don Quixote says:

"Similarly, Sancho, as regards my need of Dulcinea del Toboso, she is worth as much to me as any highborn princess on this earth. Not all the poets who praised their ladies under the names of their own choosing actually had such mistresses. Do you think that the Amarillises, the Phyllises, the Sylvias, the Dianas, the Galateas, the Filidas, and all the others of whom the books, ballads, barbershops, and theaters are full were in reality flesh-and-blood women who belonged to those that hymned their praises? Certainly not; most of the writers merely invented these creatures to provide them with a subject for their verses in order that they might be taken for lovelorn swains and respected as individuals capable of an amorous passion. And so it is enough for me to think and believe that the good Aldonza Lorenzo is beautiful and modest. . . . But to bring all this to a conclusion: I am content to imagine that what I say is so and that she is neither more nor less than I picture her and would have her be, in comeliness and in high estate."

Reality constantly escapes us. Don Quixote's reality is one which he *chooses* to see and to believe in; it does not correspond to the material objects of this world, but it leads to a life of a higher quality than is possible if one is bound by materialism. Don Quixote's is the reality of faith, as is Sancho's, although

Sancho does not see clearly; his vision is distorted by the objects of this world. There is also the reality of this world which must be overcome by Don Quixote. And all things have different meanings, depending upon the glasses through which they are seen.

There is no longer a single reality. Don Quixote and Sancho themselves have a multiple reality, for in the Second Part, on the eve of Don Quixote's third "setting-out," Don Quixote learns that he is famous as the hero of a book, a book which certain of the men and women he is to meet will also have read. Don Quixote and Sancho are famous, and the prism through which we view the story is turned again and will show us a new perspective. Great personages, a real duke and duchess, will offer the hospitality of their castle to the knight and his squire of whom they have read. To them Don Quixote and Sancho are not only men of flesh and blood who appear before them but also the heroes of a book—fictional characters who are known to them even as they are to us. This knowledge allows the duke to prepare "situations" for our unsuspecting hero and to give Sancho the promised "island."

There is even a third Don Quixote, the false Don Quixote, created by Cervantes' rival Avellaneda and banished into outer darkness by the real Quixote. Not only reality but personality exist simultaneously on several planes.

"Unconsciously, we lose ourselves," writes Castro, "in the charm of these unique pages, for in effect, such is the essential process of all human life—that of self creation and expression in contexture with all possible circumstances."[20] Our experience has been enriched by participation in the human experience communicated through the various characters we have known in *Don Quixote*, their aspirations, their heroism, their doubts, and the great purity of the hero. Don Quixote and Sancho are seeking a valid form of existence, complicated by the madness of the knight. We have experienced the paradox and contradiction of their lives; we have contemplated the possibilities of meaning in experience which remain forever possibilities. Cervantes creates his world lovingly and with humility—and this, too, becomes a part of our experience: Cervantes' humility before life and its mystery and his impatience with the unimaginative and the witless, with those who are not humble before this mystery. To grow in humility of this sort is the beginning, and one of the ends, of education.

[20] *Op. cit.*, p. 139.

A NOTE ON RECENT TEXTS IN AMERICAN HISTORY

Oscar Handlin

THE last few years have seen a significant attempt to depart from the traditional pattern of history-textbook writing. This effort reflects a changing conception of the function of the text in relation to the material of the history course and also of the function of the course in relation to higher education.

The modern textbook appeared little more than a half-century ago in a college complex in which history as a subject of instruction was relatively new. The role of the undergraduate course then was that of a survey which "covered" that part of the human past that the educated man had to know. Such courses, of necessity, were offered by men who had only the most casual acquaintanceship with most of the material they taught. The number of adequately trained instructors was, in any case, limited and was concentrated in a few institutions. Library facilities were, furthermore, pathetically inadequate.

These elements dictated the shape of the college text, which was essentially a treatise that supplied the information that the course demanded. Tightly packed with raw facts, it blanketed the subject (some would have said "smothered" it). Where the recitation system persisted, this was the reservoir from which the students drew the knowledge that they would expose in the quiz; where the lecture system had advanced, this was a sort of universal foundation on which the lecturer stood, a floor below which his exposition could not sink.

This text is anachronistic. A few individual works have attained a high level of scholarship and of literary exposition. But, increasingly, lecturers grow impatient of the restricted scope of this medium and find their own views more often in conflict with it. Improved libraries make it possible to prescribe a variety of other kinds of books. And dissatisfaction is mounting against the view that it is necessary or desirable to pack into a capsule an essential defined dose of knowledge of the human past. Instead, the influence of the various experiments with general education has encouraged the view of the history course as the introduction to the social sciences.

The most significant response to the inadequacies of the older works has been the return to the literal conception of the textbook as an accumulation of texts. Within the last year, three such collections of readings have appeared in the field of American history.[1] Each has merit in its own way; each is the product of actual teaching experience; and each demonstrates the possibility of exciting fresh teaching.

While these books have in common their opposition to the standard textbook, they also differ significantly among themselves in form and substance. Certain im-

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[1] *The People Shall Judge: Readings in the Formation of American Policy.* Selected and Edited by the Staff, Social Sciences I, College of the University of Chicago (2 vols.; Chicago: University of Chicago Press, 1949); David M. Potter, Thomas G. Manning, and Wallace E. Davies, *Select Problems in Historical Interpretation: Nationalism and Sectionalism in America 1775–1877; Government and the American Economy 1870–Present* (2 vols.; New York: Henry Holt & Co., 1949–50); *Problems in American Civilization, Readings Selected by the Department of American Studies, Amherst College,* Various editors (10 vols.; Boston: D. C. Heath & Co., 1949).

mediate variations may affect their utility in particular institutions. The Chicago *People Shall Judge* attempts the greatest coverage, is longest and most bulky. The Amherst *Problems* makes no attempt to survey a field but in brief volumes presents for solution a series of critical questions. The Yale *Select Problems* falls between the two; in each of its volumes a single theme supplies a thread of continuity.

But a more important differentiation may be made as to the kinds of materials used in each work. The Amherst collection aims to confront the student with a variety of conflicting interpretations from secondary accounts. The Chicago volumes set forth the raw materials for judgment, in the long, almost full quotation of original sources. The Yale series combines both but is consequently limited to rather brief selections. On the origins of the Civil War, for instance, the Amherst collection quotes from such historians as Rhodes, Phillips, Beard, and Randall; the Chicago volume cites Calhoun, Webster, Fitzhugh, Lincoln, Douglas, *Dred Scott* v. *Sandford*, and the party platforms; while the Yale series gives short extracts both from Calhoun, Webster, and *Dred Scott* v. *Sandford* and from the historians Cole, Hamilton, and Randall.

Of these, the Yale mixed form seems least adequate. The brevity of the selections from the historians—sometimes a single page—hardly leaves room for more than a statement of conclusions. In rendering a judgment as to the validity of the conclusions, the students have not at hand the supporting arguments. Presumably the readers are intended to form their own opinions on the basis of the original materials presented to them. The whole situation is artificial, for it rests on a previous selection not only of documents but within documents. The particular choices made in the Yale collection are imaginative and resourceful; but they still impose on the student a rigid pattern of facts and interpretations that might actually restrict the opportunity for original thinking. In that sense they bear the earmarks of the old canned experiments in the physical sciences in which procedures and results were alike equally foreknown, the experiment itself no more than the precise repetition of a routine.

The Amherst works make no pretense at presentation of the data. These are collections of points of view. But the opinions are given in enough length that the line of thought may at least be grasped. Still, these volumes can be only supplementary to some other source from which the basic information must come. They would probably be more useful in advanced, or even in graduate, than in the introductory courses.

In the Chicago *People Shall Judge* there is, of course, also selection. But this work has the virtue of uniformity of material; it exposes the student to documents which are integral wholes, reprinted almost in full, and consequently gets them to grapple with the materials of history. The difficulty is that such a collection stands or falls on the quality of the teaching that accompanies it. In the hands of skilful instructors capable of leading undergraduates in discussion, these texts can be the instruments of meaningful discoveries. Without such direction, they will not supply even the framework of data that came from the old textbook.

These works also raise a significant question as to the substantive content of the text and of the introductory history course. The older books were catholic in attitude, generally reflected the current preoccupations of historians. At the start of the century they were heavily political in orientation. But with the changes in scholarly emphasis in recent decades, they added chapters on economic, intellectual, and social history. Since the ideal was coverage, there was room for all.

To some extent, the approach in the three volumes under consideration is regressive, for all are heavily weighted in the attention to politics, *The People Shall Judge* most of all. There is an understand-

able bias here, for documents in the conventional sense are political documents. Yet the tendency is regrettable. It slights the most important areas of current historical research, and it lets slip the opportunity that history may serve as the foundation on which an integrated social science will rest.

In the Chicago volumes the compilers get no further from politics than the consideration in Units VII and IX of certain social theorists related to politics. In the Yale volumes the pages explicitly devoted to social history (Problems IV, V) deal primarily with the sectional differences of the mid-nineteenth century and lead into the Civil War material; by implication the social situation had significance only as the background of political action. The Amherst collection, looser in structure, does have room for a volume on the transcendentalists.

One need only think of the range of subjects treated in the modern social sciences to realize how constricted this approach is. The problems of personality, of family structure, of popular culture, of the business cycle—all have their historical antecedents. To pass by such problems in the context of the past is to impoverish history as much as to omit them in the context of the present is to impoverish analytical social science. And such conceptions as authority and liberty which are treated in these books have other dimensions than the political within which they are here treated. There is a striking opportunity in the present relationship of history and the social sciences for adventurous teaching that will also be intellectually profitable for the historians and social scientists who are teachers.

BIBLIOGRAPHY OF ROBERT M. HUTCHINS, 1925–50

Reuben Frodin

This bibliography has been prepared for use by students of contemporary education and for those who wish to find in one place a record of published writings of a man who, for more than twenty years, has made a significant contribution to American education and thought. As Secretary of Yale University and Dean of the Yale School of Law, and as President and Chancellor of the University of Chicago, Robert M. Hutchins has fulfilled more than eight hundred public engagements; and, as must be the case with a university administrator, the writing done for these occasions forms the bulk of his publication. Since Mr. Hutchins has freely permitted republication and multiple publication, "reprint" listings appear under each numbered original item. Acknowledgment is made to William N. Lyons and Miss Edith Heller for assistance in the preparation of this compilation.

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